GO SYSTEMELEKTRONIK

WE MAKE LIQUIDS TRANSPARENT.

Manual
BlueSense
Transducer

Blue Sense

Version of the manual: 3.1 en

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Manufacturer's declaration

In setting up the device it is important amongst other things to note the correct electrical connections, protection against connections to foreign bodies, humidity, protection against excessive moisture due to condensation and to the overheating of the device in proper and improper use.
The implementation of these measures is the responsibility of the installers who setup this device.

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Table of contents

1 Overview 6

2 Technical data and connection diagrams 8
2.1 Technical data 8
2.2 Connection diagram 1 control parameter 9
2.3 Connection diagram 2 control parameter 9
2.4 Sensor terminal connection diagram 10

3 Commissioning 11

4 Turning on the system 13
4.1 Parameter Display and Main Menu 13
4.1.1 Parameter Display 13
4.1.2 Main Menu 14

5 Setup 15
5.1 Sensors 16
5.1.1 Oxygen sensor setup (control parameter) 17
5.1.1.1 Calibration 18
5.1.1.1.1 Example 1-point-calibration oxygen 18
5.1.1.1.2 Example 2-point-calibration ORP 19
5.1.1.2 Relay 20
5.1.1.3 Current Output 21
5.1.1.4 Change Name 22
5.1.1.5 Parameter 22
5.1.1.5.1 Minimum value and Maximum value 23
5.1.1.5.2 Average and Interval 24
5.1.2 Temperature sensor setup (associated parameter) 25
5.1.3 Digital In 25
5.2 Reset 26
5.3 Comport 27
5.3.1 Protocol selection 28
5.3.2 Modbus address input 28
5.4 Language setting 29
5.5 Time / Date 30

6 Screen 31

7 Memory Card 32
7.1 Save Data 32
7.2 Adjustment of the storage interval 33
7.3 Update (Firmware) 33
7.4 Read Data 34

8 Programs 35
8.1 Flushcontrol Parameters 37
8.2 Parameter PID 38
8.2.1 Parameter PID (Sensor selection) 40

9 Info Transducer *40*

10 Version notice *41*

11 Installation notes *41*

12 Maintenance instructions *41*

Appendix A - Modbus *42*

Appendix B - Connection to a BlueBox *45*

Appendix C - Adjustment of the touch display *46*

Appendix D - Housing dimensions *47*

Appendix E - Status and error messages *48*

Appendix F - DIP switch configuration *50*

Appendix G - Differentiation motherboard Version A⇔B *50*

Appendix H - Multipoint calibration *51*

Appendix I - Menu structure *53*

1 Overview

This user manual describes a BlueSense-Transducer.

The Transducer

- receives the signals of the connected sensors,
- generates there from measurement values,
- displays the measurement values,
- transduces the measurement values into analogue current values (4 – 20 mA),
- transmits the current values to a signal processing systems,
- transmits the measurement values via CAN-bus to a BlueBox,
- is able to network with PLC[1]-Systems via RS-232 or RS-485,
- stores the measurement values on a SD Memory Card,
- switches relays by overrun or underrun of settable alarm values,
- converts the measurement values of a conductivity sensor into salinity[2],
- switches two internal relays at adjustable times (here called Flushcontrol),
- executes a relay control program and a PID controller
- and executes customer-specific programs.

Connectable sensors:

• Conductivity: measuring principle: inductive	0 to 4000 µS/cm
with integrated temperature sensor: measuring principle: NTC	0 to 80°C
• Temperature: measuring principle: NTC	-5 to +80°C
Standard temperature sensor SEMI 833	25°C ≙ 83 kΩ
• Dissolved oxygen: measuring principle: galvanic cell	0 - 20 mg/l
• Dissolved oxygen: measuring principle: fluorescence	0 - 25 ppm
• pH glass electrode	pH3 - pH13
• Ion-selective electrode	
• Turbidity submersible: scattered light 90°, wave length 860 nm	0 - 3000 FNU
• Turbidity flow through: scattered light 90°, wave length 860 nm	0 - 100 FNU
• ORP	-2000 to +2000 mV
• Current input, resistance 50 Ohm	4 - 20 mA
• Voltage input	0 - 50 V and other

- All established sensors with current or voltage outputs, e.g.: Cl, ClO_2, NH_4, etc.

The number of sensors that can be connected is determined by the delivered Transducer configuration. There are two configurations:

- **1 Control parameter = 1 analogue input**
  One sensor is connected. One control parameter is measured and where applicable the temperature as an associated parameter.
- **2 Control parameters = 2 analogue inputs**
  Two sensors are connected. Two control parameters are measured and where applicable the temperature for each sensor as associated parameters.

To determine if your Transducer has 1 or two 2 control parameters please refer to the shipping note, the serial number of the transducer is on the right hand side of the housing.

[1] Programmable Logic Controller

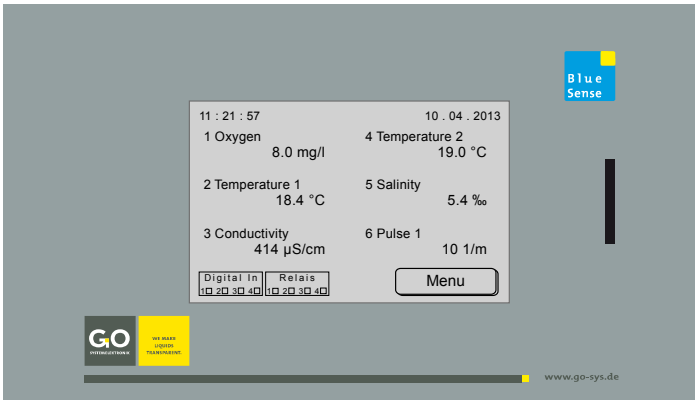
[2] Salinity according to the general formula of the UNESCO for seawater

The Transducer has 4 relays:

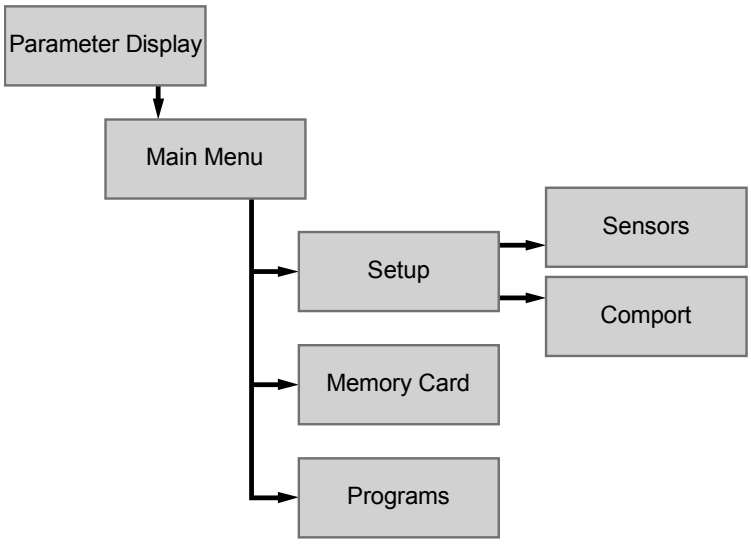
- 2 relays with a switching capacity of 24 V / 0.5 A (only low-voltage)
- 2 relays with a switching capacity of 230 VAC / 2 A or 24 VDC / 6 A

The transducer can store the states of the inputs (and therefore also the measured values) and the error messages on an SD Memory Card. The Transducer itself has no memory.

The Transducer is operated via a touch screen. Through a few steps one can, for example, undertake calibrations and set switching values.
The menu options are displayed in simple to understand text.



Basic structure of the menu navigation:



see *Appendix I - Menu structure*

2 Technical data and connection diagrams

2.1 Technical data

Article-Nr. 485 0001-X

Inputs:

- 1 or 2 analogue inputs (1 Control parameter or 2 Control parameters)
  The particular configuration is on the shipping note, the serial number of the transducer is on the type plate at the right hand side of the housing.
- 2 digital inputs (static), potential-free contacts, switching current approx. 6 mA
- 2 pulse inputs selectable to PNP/NPN (optional: static), switching current approx. 6 mA, measurement range 0.05 Hz – 1000 Hz

Outputs:

- 2 current outputs (4 to 20 mA), active
- 2 relays with a low-voltage (only) switching capacity of 24 V / 0.5 A
- 2 relays with a switching capacity of 230 VAC / 2 A or 24 VDC / 6 A

Communications interfaces:*

- RS-232 or RS-485, each with 9600 Baud, selective EMC or Modbus
  or
- CAN-bus connector for connection to the BlueBox-System

Voltage feed:*

- 12 VDC (9 V – 18 V), received power max. 7 W
  or
- 24 VDC (18 V – 36 V), received power max. 7 W
  or
- 230 VAC (90 V – 260 V), received power max. 7 W

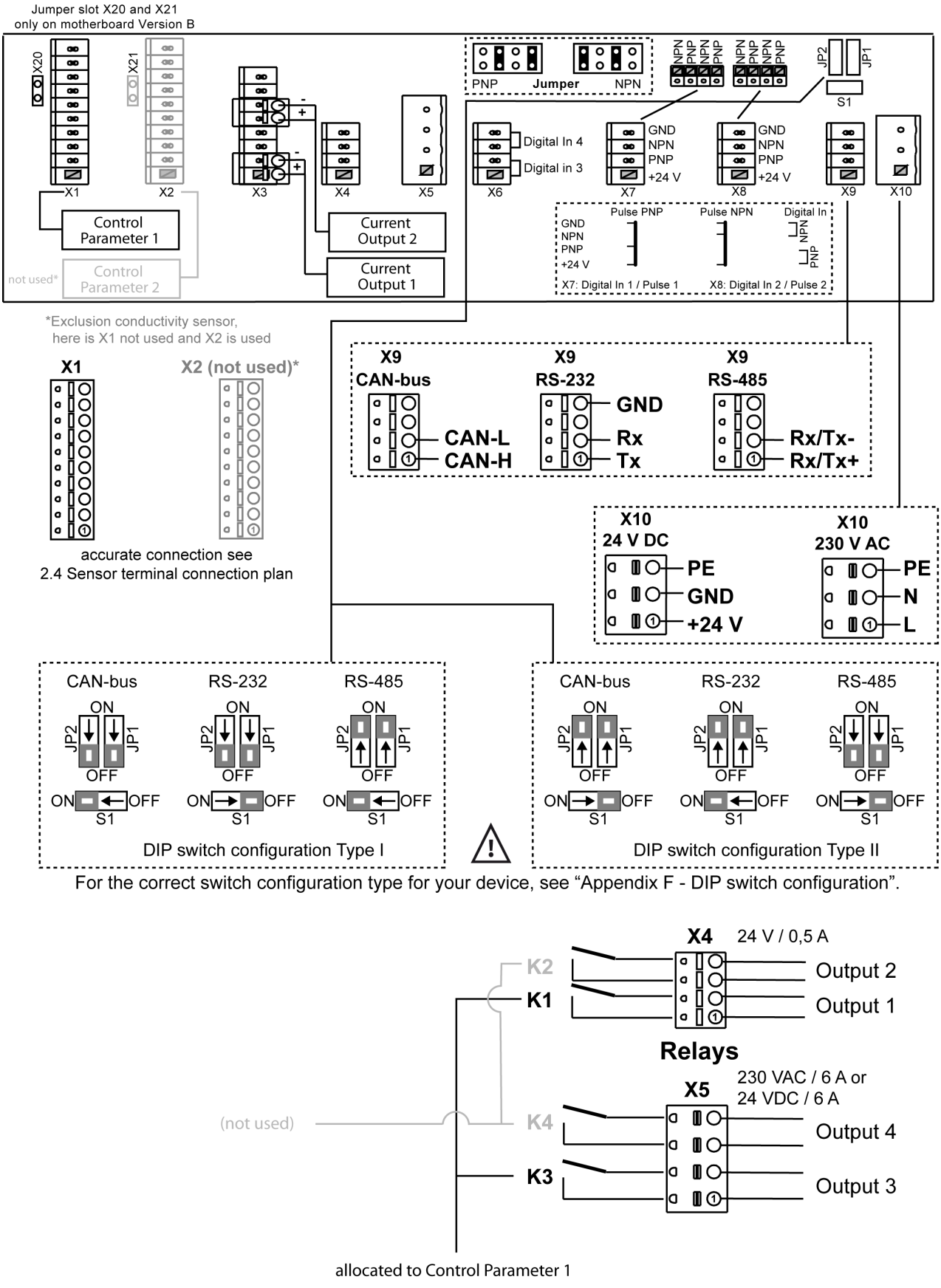
Display: LCD Touch Panel: 240 x 128 pixels; secure temperature range -10 °C to +45 °C

Housing: Polycarbonate, 235 mm x 185 mm x 119 mm; protection code IP65;
secure temperature range -10 ° C to +45 °

Weight: 1.35 kg

* The equipment of your transducer is documented on the sticker on the inside of the cover for the cable connections.

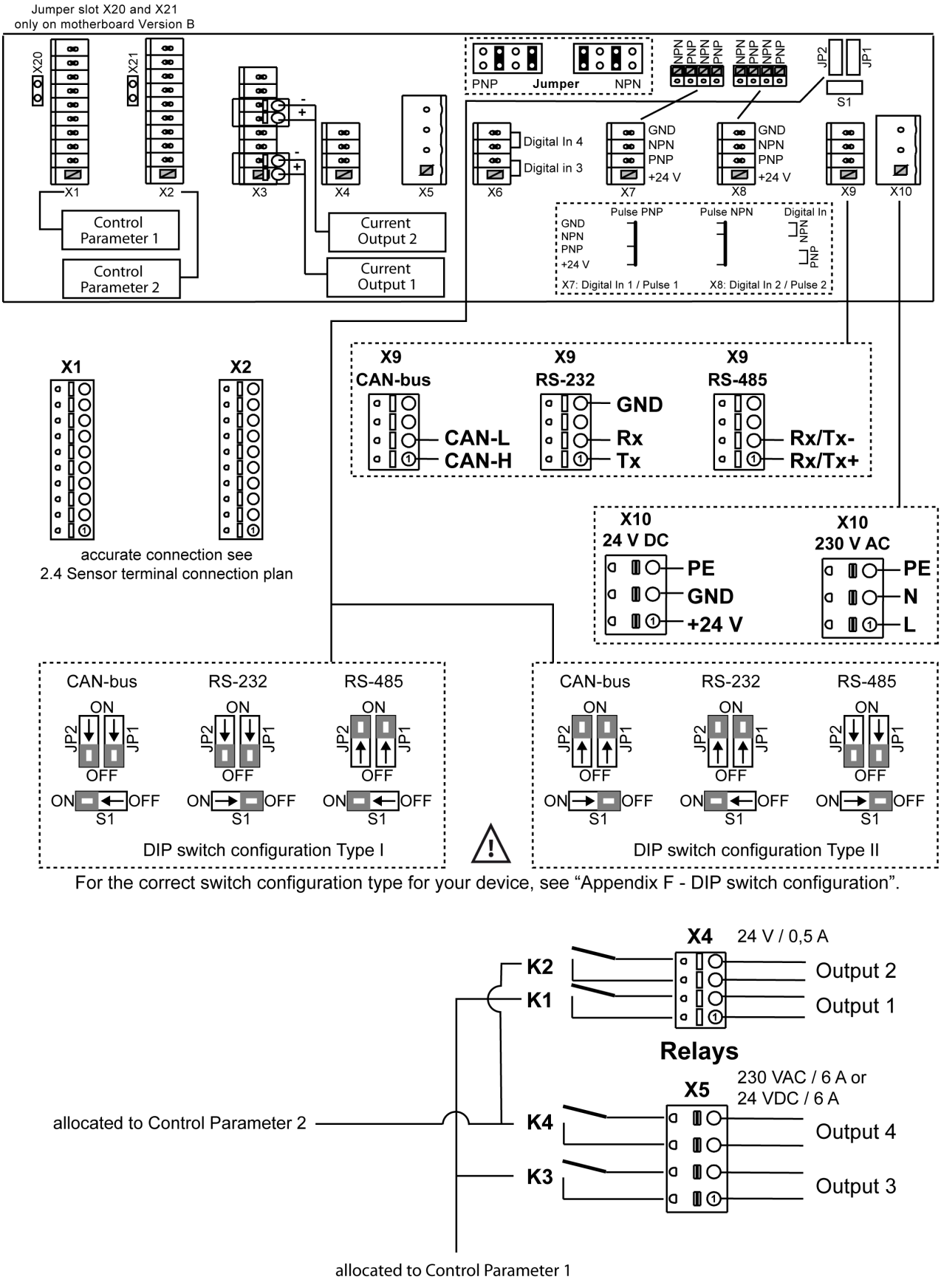
2.2 Connection diagram 1 control parameter



For the correct switch configuration type for your device, see “Appendix F - DIP switch configuration”.

Schutzvermerk DIN 34-1-D Copyright DIN 34-1-E

2.3 Connection diagram 2 control parameter

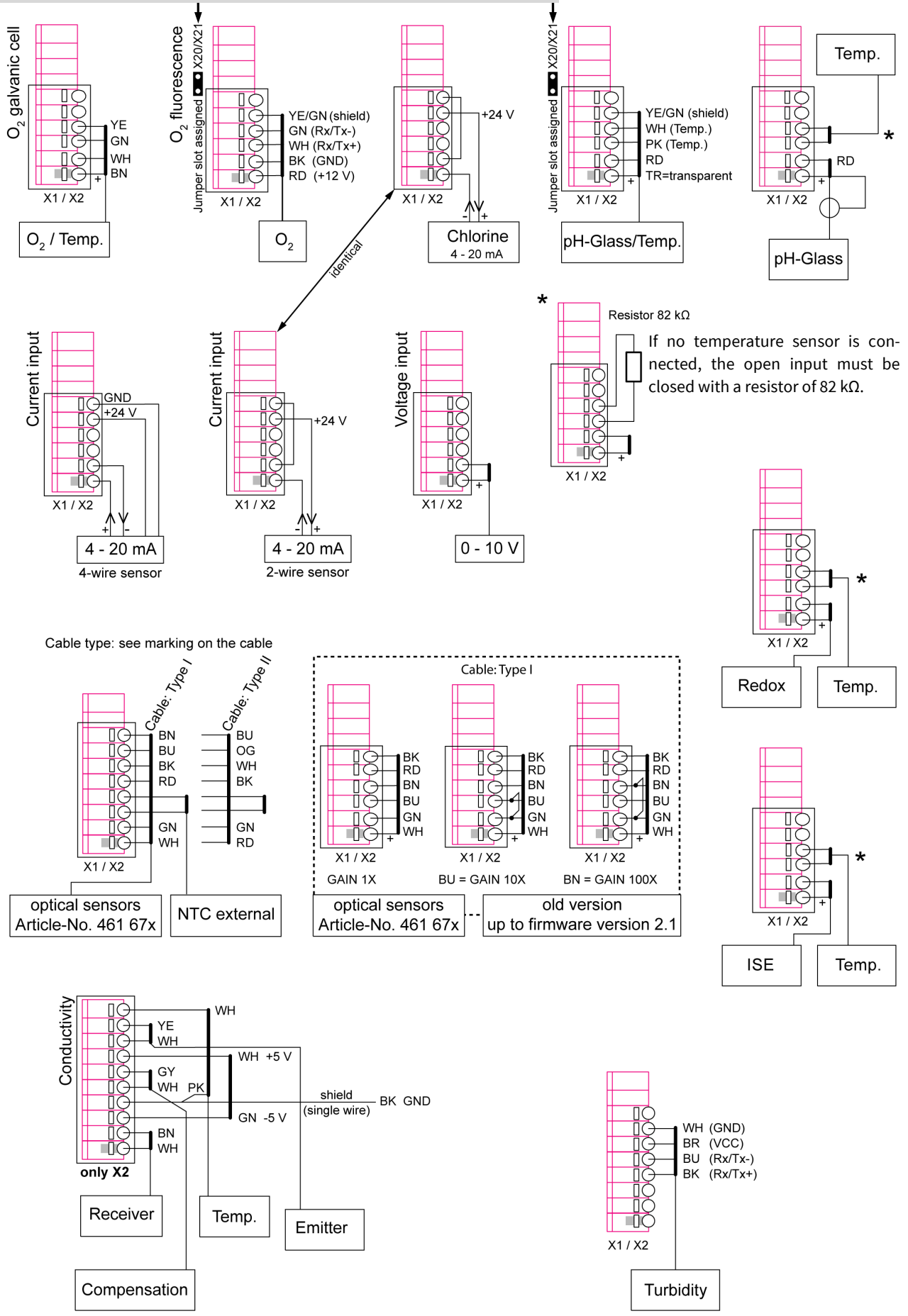


Schutzvermerk DIN 34-1-D Copyright DIN 34-1-E

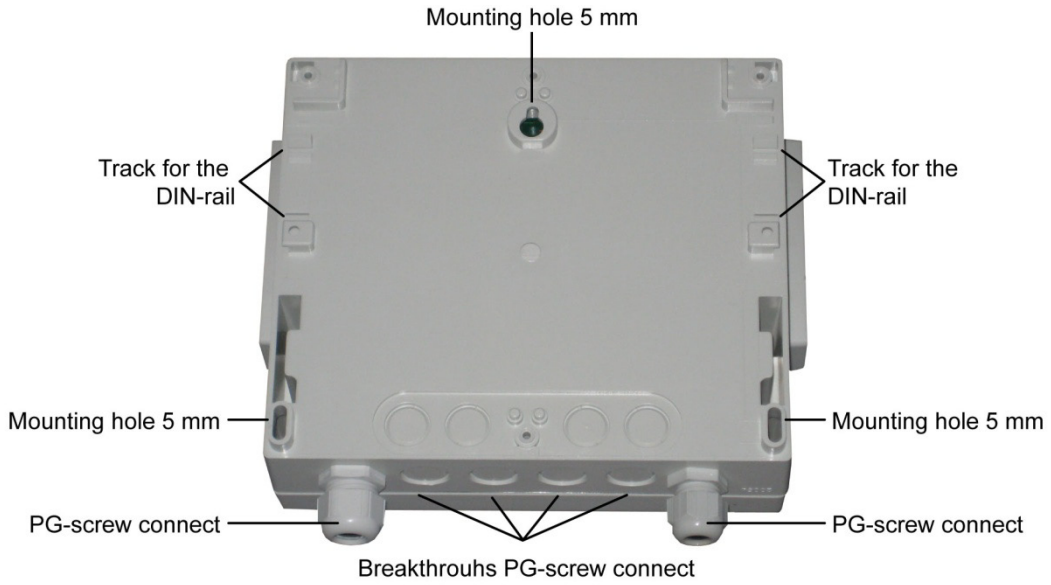
2.4 Sensor terminal connection diagram

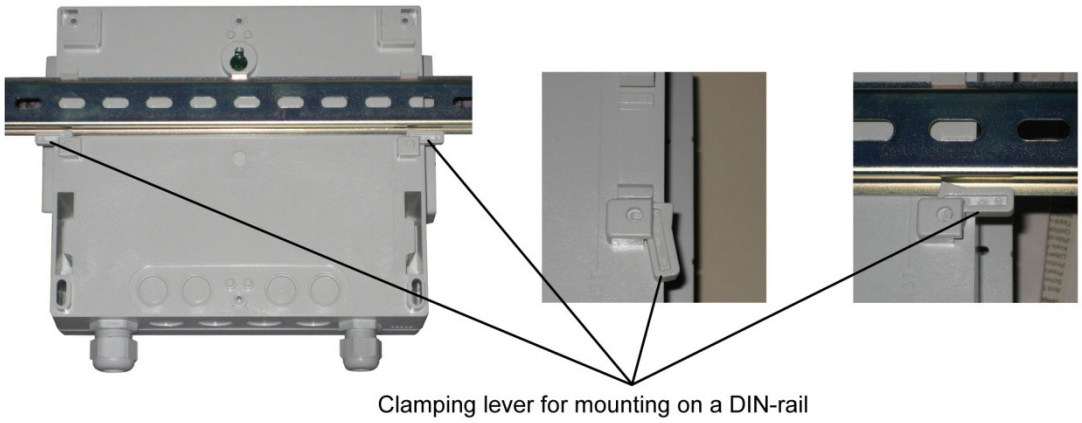
Jumper slot X20/X21 (= PE-connection to PIN 5) only exists on mothertboard Version B.
On motherboard Version A the shield cable is connected with PIN 3 of slot X10.

→ see also *Appendix G - Differentiation motherboard Version A⇔B*



3 Commissioning





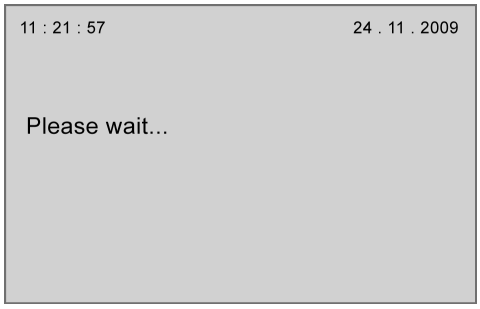
The Transducer's respective sensors, supply voltage, current outputs and, where applicable, the relays, are to be connected via the spring-loaded connectors. The terminals are marked (see terminal connection diagram on pages 9/10). The cable entry is via the PG-glands.

To-do list after initial start-up:

- language setting: see *5.4 Language setting*
  preadjustment: english
- time setting see *5.5 Time / Date*
  preadjustment: timezone of the customer
- if applicable sensor calibration see calibration sheet
  e.g. for ISE sensors
- customized settings
  relay settings (switching and hysteresis values), current output settings, etc.
- if applicable adjustment of the touch display
  The touch-panel is balanced and ready for use. A long storage by the customer may cause the necessary of a new adjustment (see *Appendix C - Adjustment of the touch display*).

4 Turning on the system

After the Transducer is switched on a software check and system initialisation occurs.



When the system is operational, the parameter display is activated.

4.1 Parameter Display and Main Menu

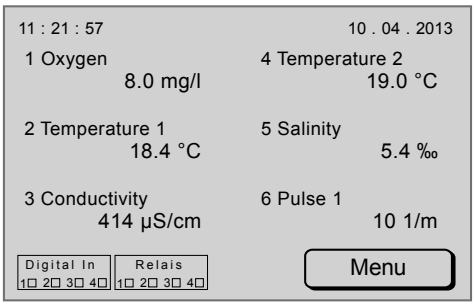
4.1.1 Parameter Display

The parameter display can show up to 6 different values.
Here, as an example, the measured parameter display with 6 displayed values.

- **1 Oxygen**: the first control parameter oxygen
- **2 Temperature**: the associated temperature parameter for the first control parameter
- **3 Conductivity** : the second control parameter conductivity
- **4 Temperature**: the associated temperature parameter for the second control parameter
- **5 Salinity**: computed value from a conductivity measurement
- **6 Pulse 1**: value of the first pulse input

The names of the sensors are automatically numbered and listed.

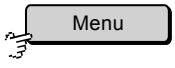
In top left-hand corner the time is displayed. In top right-hand corner the date is displayed.



In the lower left corner the states of the 4 Digital In inputs and the switching states of the 4 relays are displayed (see Sensor terminal connection diagram).
A filled square (■) symbolizes the state 1, i.e. an input/relay is closed.
An empty square (□) symbolizes the state 0, i.e. an input/relay is open.

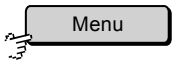
Status messages appear at the bottom of the parameter display (see *Appendix E - Status and error messages*).

When there is user inactivity in all other menus, the software switches in 2 minutes back to the Parameter Display. Not valid for input menus.

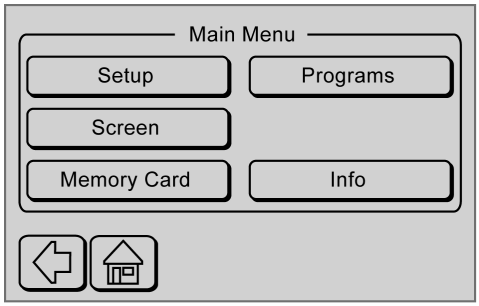


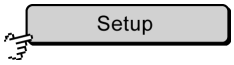
Switch to the Main Menu

4.1.2 Main Menu



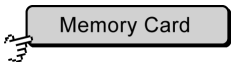
Parameter Display



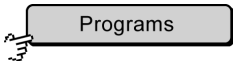


Switch to the Setup menu, § 5.

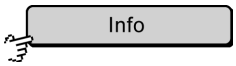
Switch to the Illumination menu, § 6.



Switch to the Memory Card menu, § 7.



Switch to the Programme menu, § 8.

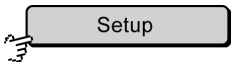


Switch to the display of the firmware version, § 9.

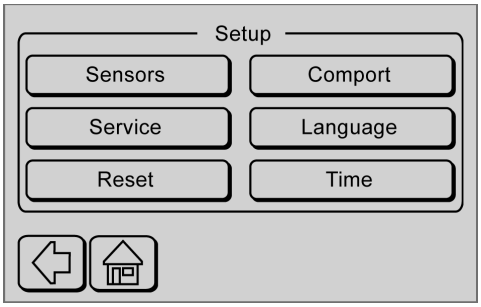
Switch back to the Parameter Display.

Switch to the Parameter Display.

5 Setup



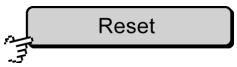
Main Menu



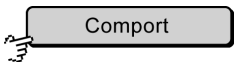
From this menu you can adjust the settings of the connected sensors and change system parameters.

Switch to the sensor menu, § 5.1

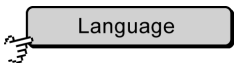
Switch to the password protected factory-presets. User changes are not necessary.



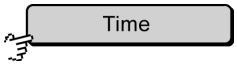
Switch to the Reset menu, § 5.2



Switch to the Comport menu, § 5.3



Switch to language setting menu, § 5.4



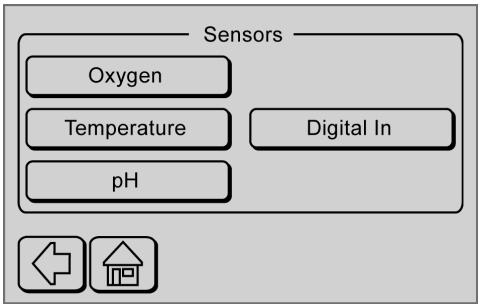
Switch to the time and date entry menu, § 5.5

Switch back to the Main Menu.

Switch to the Parameter Display.

5.1 Sensors

Setup Menu



From this menu you can set the parameters of the connected sensors.
The specific parameter setup is described in the sensor description.

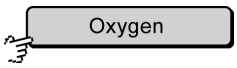
The number of sensors that can be connected is determined by the delivered Transducer configuration. There are two configurations:

- **1 Control parameter**
  One (1) sensor is connected. One control parameter is measured and where applicable the temperature as an associated parameter.
- **2 Control parameters**
  Two (2) sensors are connected. Two control parameters are measured and where applicable the temperature for each sensor as associated parameters.

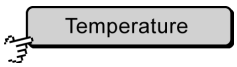
To determine if your transducer has one (1) or two (2) control parameters please refer to your shipping receipt.

The example has:

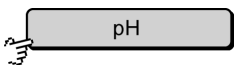
- 1. Sensor: Oxygen sensor (first control parameter)
- 2. Sensor: Oxygen sensor's integrated Temperature sensor (associated parameter)
- 3. Sensor: pH sensor (second control parameter)



Switch to menu of the first sensor, in this case oxygen, § 6.1.1.



Switch to menu of the second sensor, in this case temperature, § 6.1.2.



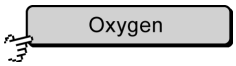
Switch to the menu of the third sensor, in this case pH.

Switch to the information about the state of the digital inputs, § 6.1.3.

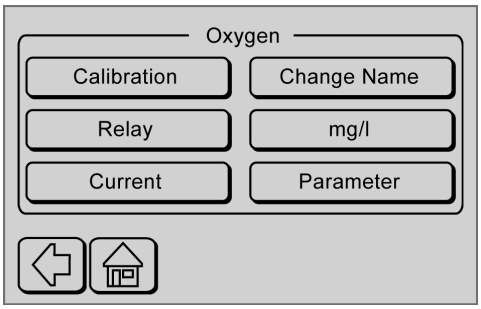
Switch back to the Setup menu.

Switch to the Parameter Display.

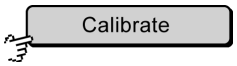
5.1.1 Oxygen sensor setup (control parameter)



Sensors

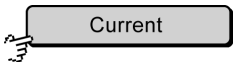


From this menu you can set the parameters of the selected sensor.
The specific parameter setup is described in the sensor description.

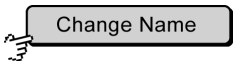


Switch to the Calibration menu for the first sensor. § 5.1.1.1.

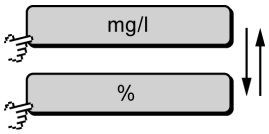
Switch to the Relay setup for the first sensor, § 5.1.1.2.



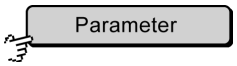
Switch to the Current Output setup for the first sensor, § 5.1.1.3.



Switch to the Change Name menu of the first sensor, § 5.1.1.4.



Switch between the units mg/l and %-saturation.
The button is also a status indicator.
Appears only if two measurement units are possible.



Switches to

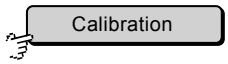
- the setting of the estimated minimum and maximum measurement value of the sensor, needed for a connected BlueBox
- the setting of the number of single measurements from which the measurement value will be calculated by means of arithmetic averaging
- to the setting of the measurement interval

see § 5.1.1.5

Switch back to the Sensors menu.

Switch to the Parameter Display.

5.1.1.1 Calibration

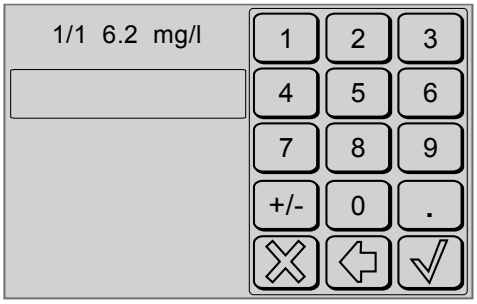


Sensor setup

Depending on the connected sensor there is a 1-point calibration or a 2-point calibration offered.*

5.1.1.1.1 Example 1-point-calibration oxygen

1-Point-Calibration Example Oxygen in mg/l:



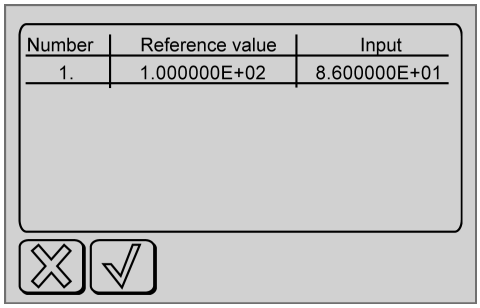
1/1	actual number of the measurement point / number of measurement points
6.2	actual measured value
mg/l	unit of the measurement

Hold the sensor in a calibration fluid. Measure the oxygen content of the calibration fluid with a reference meter. This value from the reference meter has to be entered.

Aborts the calibration and switches to Sensor control-parameter setup.

Deletes the last entered character.

Saves the input and switches to the List menu.
Without a setting the value is set to 0. Not recommended!



List menu
Display of the measured value
Display of the entered value (input)

With the List menu you can check the calibration values.

Aborts the calibration and switches to Sensor setup.

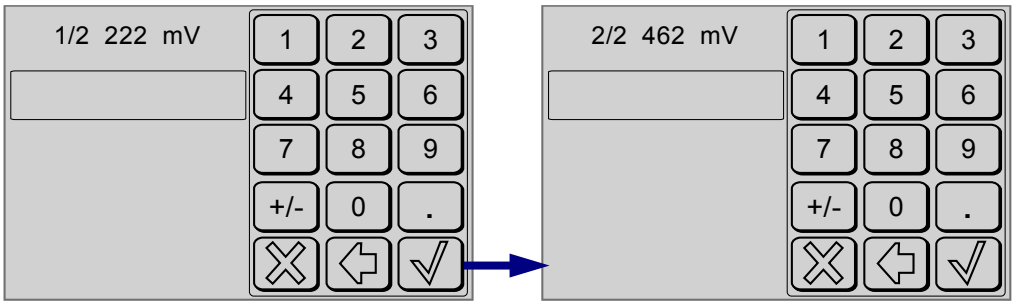
Saves the calibration and switches to Sensor setup.

The calibration is saved and completed.

* Exceptions possible, see *Appendix H - Multipoint calibration*

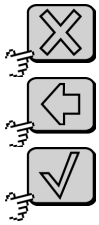
5.1.1.1.2 Example 2-point-calibration ORP

2-point-calibration Example ORP:



1/2 **2/2**	actual number of the measurement point / number of measurement points
3 **11**	actual measured value
mV	unit of the measurement

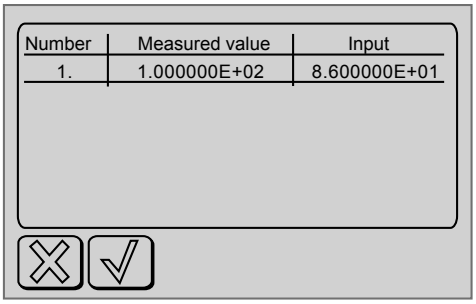
Hold the sensor in a reference fluid and enter the ORP value of the reference fluid.



Aborts the calibration and switches to Sensor setup.

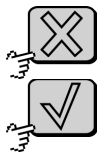
Deletes the last entered character.

First value: accept the value and switch to the entry of the second value.
Second value: accept the value and switches back to the setup.
Without a setting the value is set to 0. Not recommended!



List menu
List of Reference values
List of Input values

With the List menu you can check the calibration values.

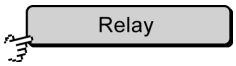


Aborts the calibration and switches to Sensor setup.

Saves the calibration and switches to Sensor setup.

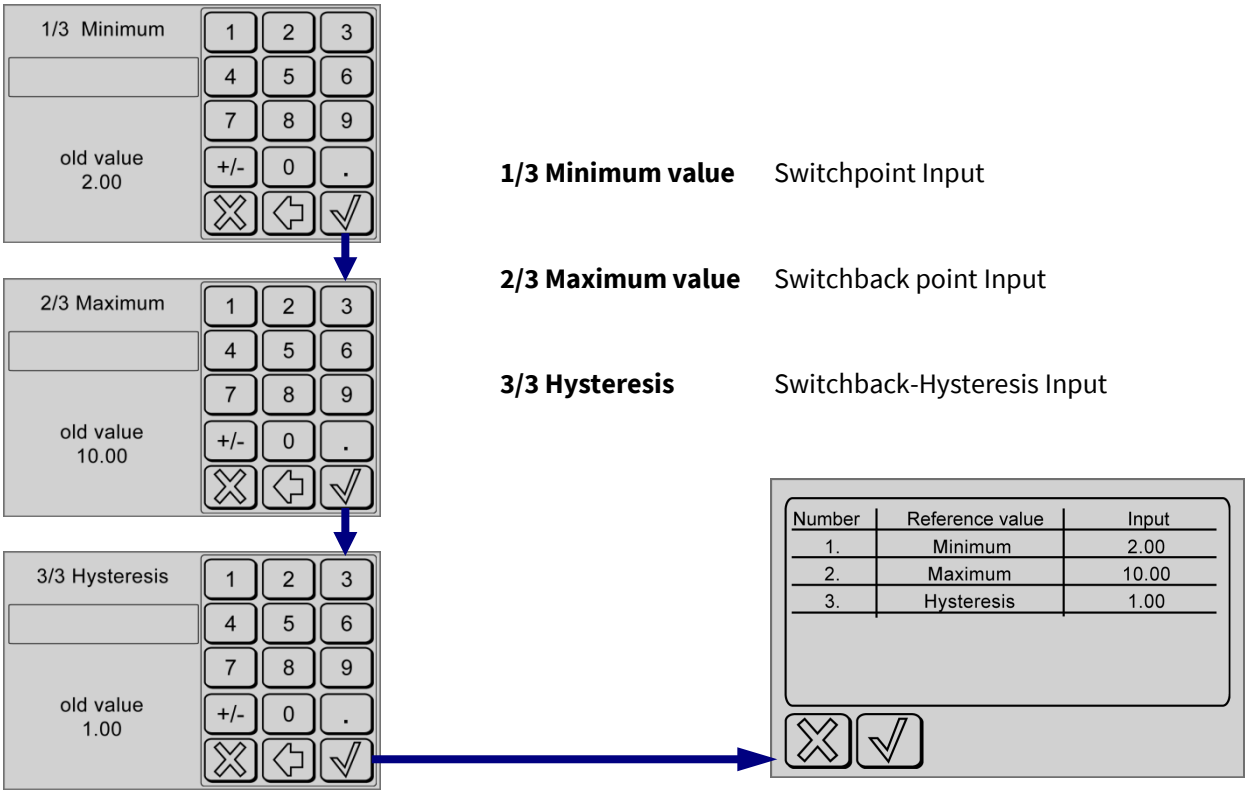
The calibration is saved and completed.

5.1.1.2 Relay



Oxygen sensor setup (control parameter)

From this menu you can set the Switchpoint, the Switchback point and the Switchback-Hysteresis* of the relay. The unit of the values is the unit of the measured values (in this example mg/l).



1/3 Minimum value Switchpoint Input

2/3 Maximum value Switchback point Input

3/3 Hysteresis Switchback-Hysteresis Input

Aborts the input and switches to Sensor setup.

Deletes the last entered character.

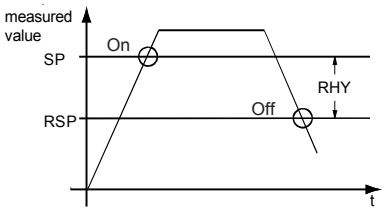
Saves the input and switches to the next menu.
Without setting the old value is stored.

Aborts the settings and switches to Sensor setup.

Saves the settings and switches to Sensor setup.

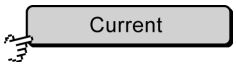
The setting of the relay is saved and completed.

*



Switchpoint / Switchbackpoint / Switchback-Hysteresis Example: maximum switching value
The Switchpoint (SP) is the value at which, when reached, a change in state of the switch occurs. The switch then stays in this new state until the measured value falls below the Switchbackpoint (RSP). The Switchback-Hysteresis value (RHY) determines the Switchbackpoint (Switchpoint mi-nus Switchback-Hysteresis = Switchbackpoint).
maximum switching value (Max.) is SP RSP is SP minus the switchback hysteresis value

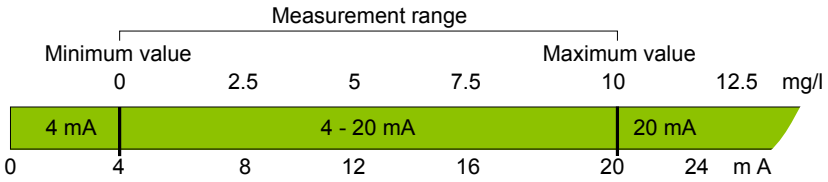
5.1.1.3 Current Output

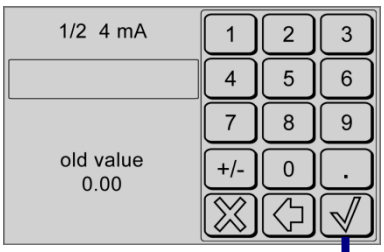


Oxygen sensor setup (control parameter)

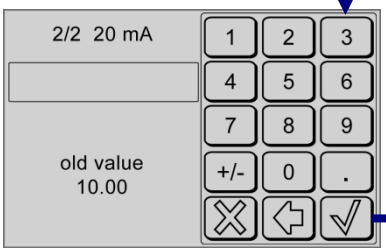
The Sensor signal controls the allocated current output (control parameter 1 ⇒ current output 1, control parameter 2 ⇒ current output 2).
Thus, the signal is accurately represented by the current output, you must set a **measurement range**.
Use these menus to determine the measurement range with the input of a minimum and a maximum value.

Example:

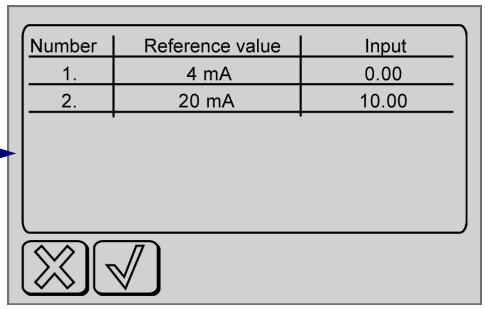




1/2 4 mA Input of the measurement value that corresponds to 4 mA.
Minimum value of the measurement range



2/2 20 mA Input of the measurement value that corresponds to 20 mA.
Maximum value of the measurement range



Aborts the input and switches to the Current menu.

Deletes the last entered character.

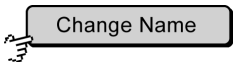
Saves the input and switches to the next menu.
Without setting the old value is stored.

Aborts the settings and switches to the Current menu.

Saves the settings and switches to the Current menu.

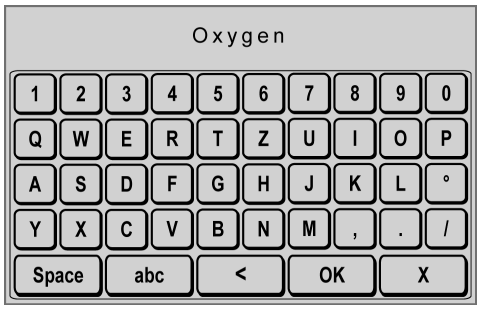
The current settings are saved and completed.

5.1.1.4 Change Name

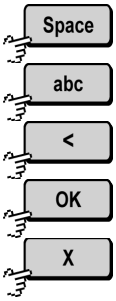


Sensor setup (control parameter)

Example Oxygen:



From this menu you can set the name of the connected sensor.



Space character

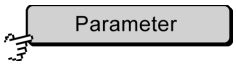
Capitalization.

Deletes the last entered character.

Save the input and switch back to the Sensor parameter setup.

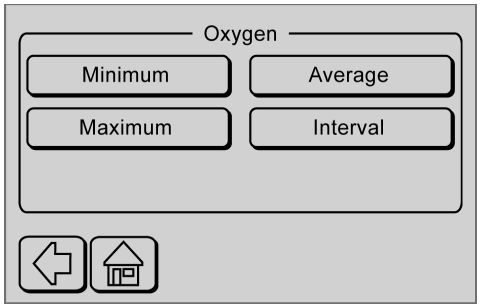
Switch back to the Sensor parameter setup without saving the input.

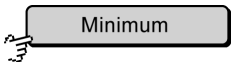
5.1.1.5 Parameter



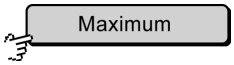
Sensor setup (control parameter)

Example Oxygen:

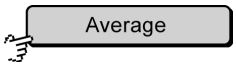




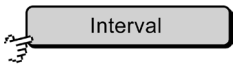
Switches to the setting of the estimated minimal measurement value of the sensor, needed for a connected BlueBox.



Switches to the setting of the estimated maximal measurement value of the sensor, needed for a connected BlueBox.



Switches to the setting of the estimated maximal measurement value of the sensor, needed for a connected BlueBox.

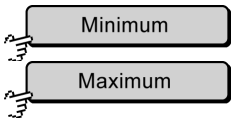


Switches to the setting of the measurement interval.

Switch back to Sensor control-parameter setup.

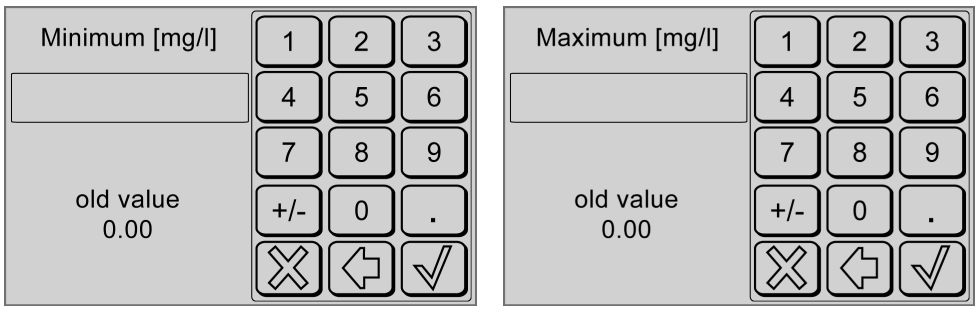
Switch to the Parameter Display.

5.1.1.5.1 Minimum value and Maximum value



Parameter Oxygen (control parameter)

Input of the estimated minimum and maximum measurement value of the sensor, needed for a connected BlueBox.



input minimum measurement value input maximum measurement value

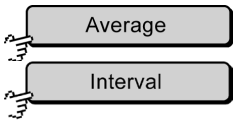
Presently active value is shown as “old value“.

Aborts the input and switches to the Parameter menu.

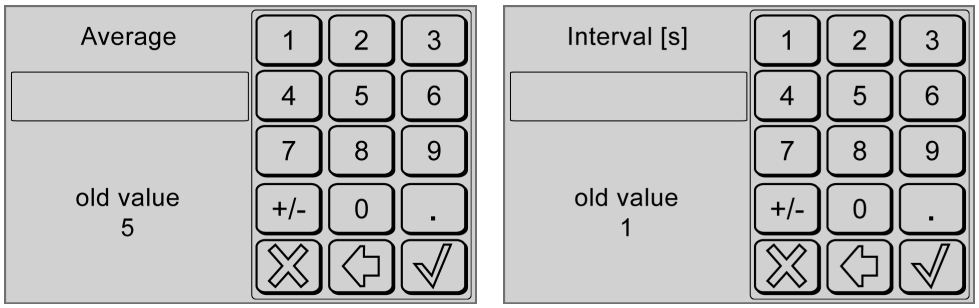
Deletes the last entered character.

Saves the input and switches back to the Parameter menu.
Without setting the old value is stored.

5.1.1.5.2 Average and Interval



Parameter Oxygen (control parameter)

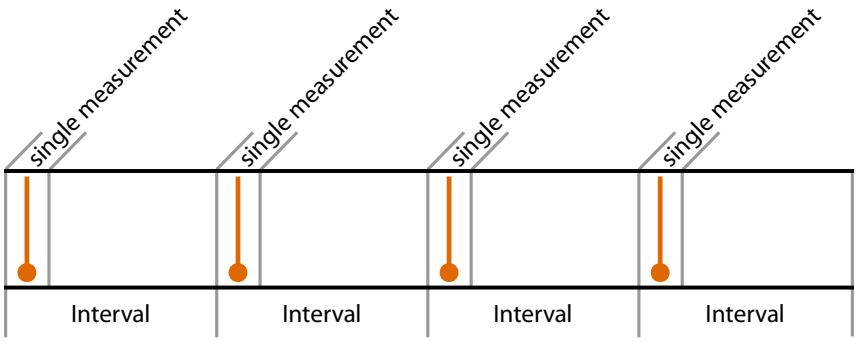


input average input interval in s

Presently active value is shown as “old value“.

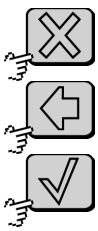
Average:
The measurement value is the arithmetic average of the last here entered number of single measurements (default setting is here 5).

Interval:
Time in seconds between the start of a single measurement and the start of the next single measurement (default setting is here 1 s).



Example: measurement from 4 single measurements

The average and interval values vary depending upon the connected sensor.

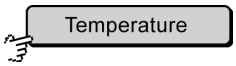


Switches back to the Parameter menu without saving the input.

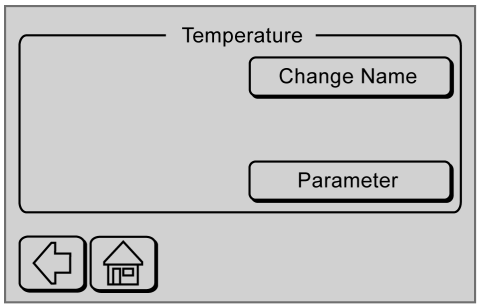
Deletes the last entered character.

Saves the input and switch back to the Parameter menu.
Without setting the old value is stored.

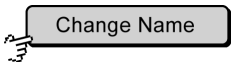
5.1.2 Temperature sensor setup (associated parameter)



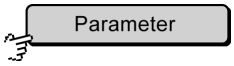
Sensors



In setting up the associated parameter Temperature, only the name of the sensor can be changed.



Switch to the renaming of the temperature sensor, § 5.1.1.4.



Switches to

- the setting of the estimated minimum and maximum measurement value of the sensor, needed for a connected BlueBox
- the setting of the number of single measurements from which the measurement value will be calculated by means of arithmetic averaging
- to the setting of the measurement interval

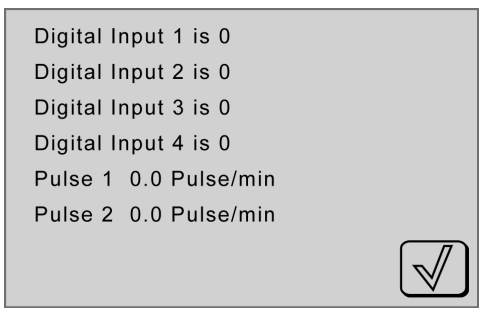
§ 5.1.1.5

Switch back to the Sensors menu.

Switch to the Parameter Display.

5.1.3 Digital In

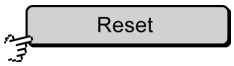
Setup menu



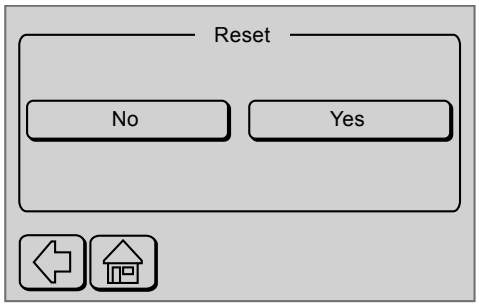
Here the state of the digital inputs is displayed. If no sensor is connected, either 0 or 0.0 is displayed.

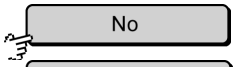
Switch back to the Setup menu

5.2 Reset

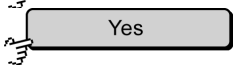


Setup menu





Switch back to the Setup menu.



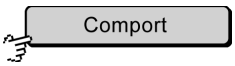
Resets all user settings to factory settings.
Exception: Sensor calibration data remains unchanged.
Switch back to the display of Measured Values.

Switch back to the Setup menu.

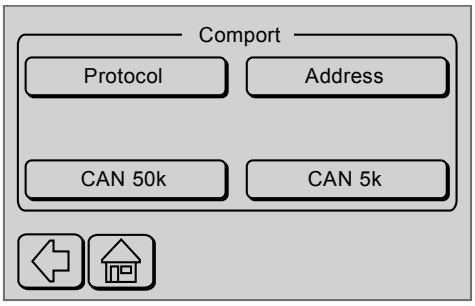
Switch to the Parameter Display.

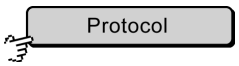
5.3 Comport

Settings for the RS-232/RS-485 interface and for CAN-bus.

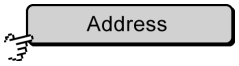


Setup menu.





Switch to the Activation/Inactivation of the Modbus protocol.
Only visible if a RS-232/RS-485 interface is existing.



Switch to the input of the Modbus address of the transducer 5.3.2.
Only visible if a RS-232/RS-485 interface is existing.

Sets the CAN-bus data transfer rate to 50 kbit/s.
The button is also a status indicator.
Only visible if a CAN-bus interface is existing.

Sets the CAN-bus data transfer rate to 5 kbit/s.
The button is also a status indicator.
Only visible if a CAN-bus interface is existing.

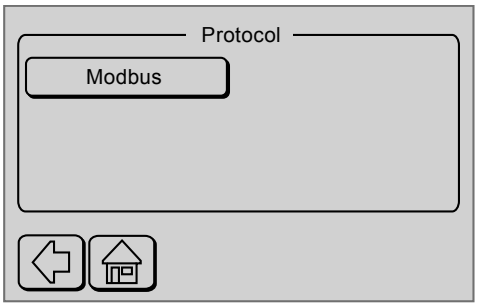
Switch back to the Setup menu.

Switch to the Parameter Display.

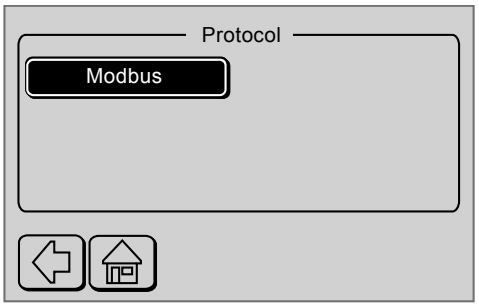
5.3.1 Protocol selection

Comport menu

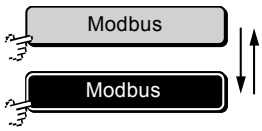
This menu is designated for the selection between different transmission protocols in future firmware versions.



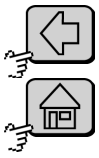
Modbus protocol inactive



Modbus protocol active



Switches the Modbus protocol active or inactive.
The button is also a status indicator.

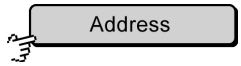


Switch back to the Comport menu.

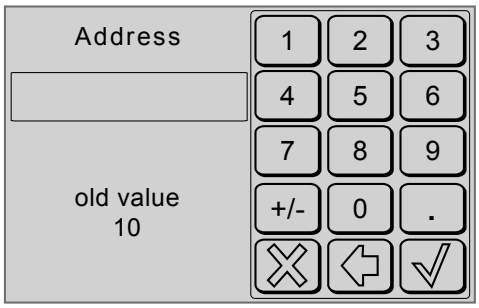
Switch to the Parameter Display.

Note: The RS-232 and RS-485 interfaces can be operated only useful with active Modbus protocol.

5.3.2 Modbus address input



Comport menu



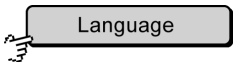
Here you can enter the Modbus address of the transducer, the factory setting is 10.
The presently active value is displayed above the input field.

Switch back to the Comport menu without saving the input.

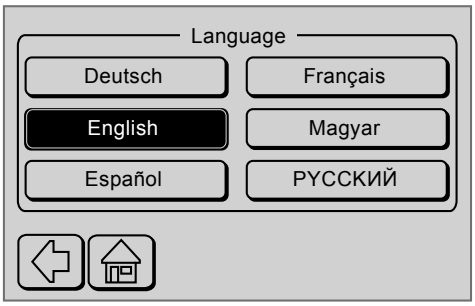
Deletes the last entered character.

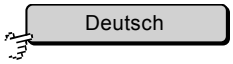
Save the input and switch back to the Comport menu.
Without setting the old value is stored.

5.4 Language setting

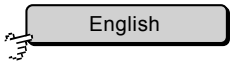


Setup menu.

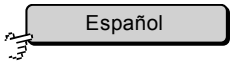




Sets the menu language to German.
The button is also a status indicator.

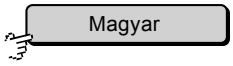


Sets the menu language to English.
The button is also a status indicator.



Sets the menu language to Spanish.
The button is also a status indicator.

Sets the menu language to French.
The button is also a status indicator.



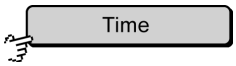
Sets the menu language to Hungarian.
The button is also a status indicator.

Sets the menu language to Russian.
The button is also a status indicator.

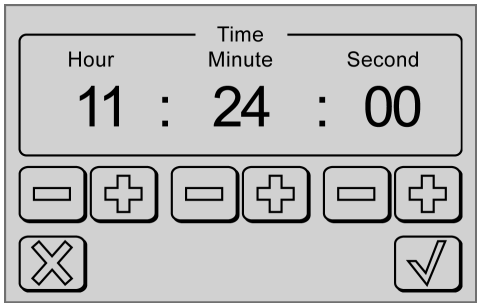
Switch back to the Setup menu.

Switch to the display of Measured Values.

5.5 Time / Date



Setup menu

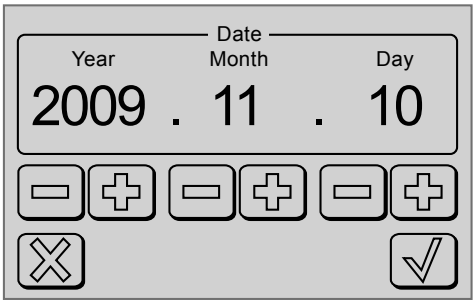


Reduces the hours / minutes / seconds by 1

Increases the hours / minutes / seconds by 1

Switch back to the Setup menu without storing the entry.

Save the entry and switch to the Date entry menu.



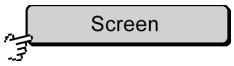
Reduces the year / month / date by 1

Increases the year / month / date by 1

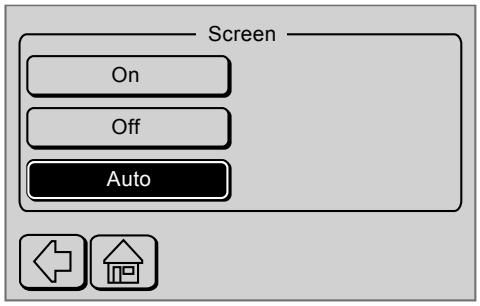
Switch back to the Setup menu without storing the entry.

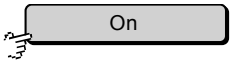
Save the entry and switch back to the Setup menu.

6 Screen

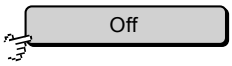


Main Menu

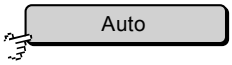




Turns on the backlight of the display.
The button is also a status indicator.



Turns off the backlight of the display.
The button is also a status indicator.



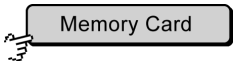
Turns off the backlight of the display after 60 s user inactivity.
Does not apply to input menus and list menus
If the backlight is off, it can be turned on again by pressing any button.
The button is also a status indicator.

Switch back to the Main Menu.

Switch to the display of Measured Values.

7 Memory Card

7.1 Save Data

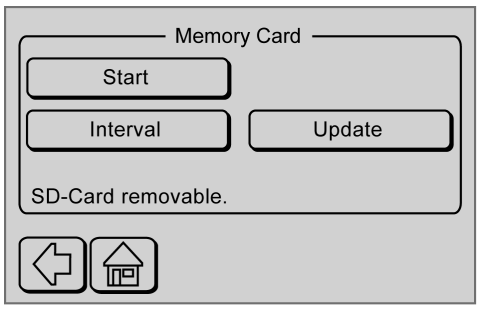


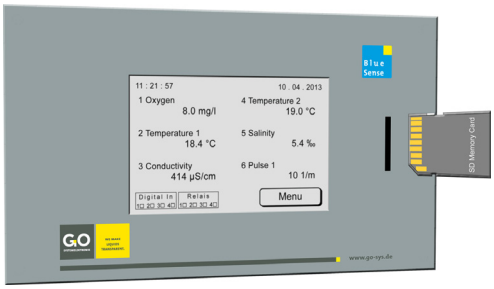
Main Menu

You can store the data measured by the Transducer on an SD Memory Card. The data is saved as a csv-file. You activate the logging of data onto the SD Memory Card by pressing

.

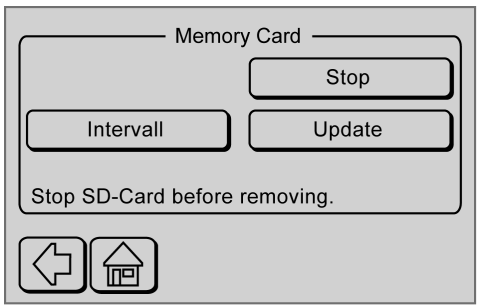
Important: The SD Memory Card must be formatted with FAT16. (NOT: FAT32 or NTFS!)





After inserting the SD card, please press

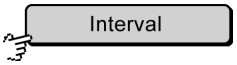
. The SD Memory Card is detected as long as “Please wait ...” appears on the display.
Thereafter the following menu appears, and the SD Memory Card is written.



If the transducer starts with an inserted SD card (e.g. after a power failure), data recording starts automatically.

Important: The SD Memory Card may only be removed after you have pressed

.
Otherwise, the data on the SD Card is corrupted.



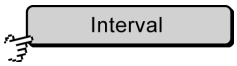
Switch to the input of the storage interval.

Switch to the firmware update.

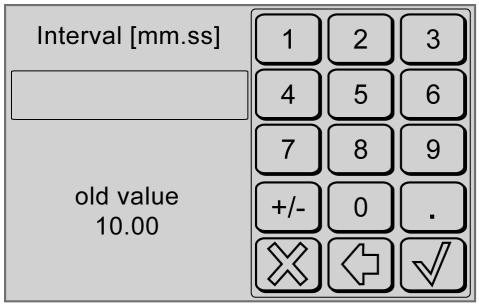
Switch back to the Main Menu.

Switch to the Parameter Display.

7.2 Adjustment of the storage interval



Memory Card Menu



Input format mm.ss
minimum input = 00.05 (5 s) maximum input = 60.00 (60 m)
Presently active value is shown as “old value“.

From this menu you can set the storage interval in minutes.

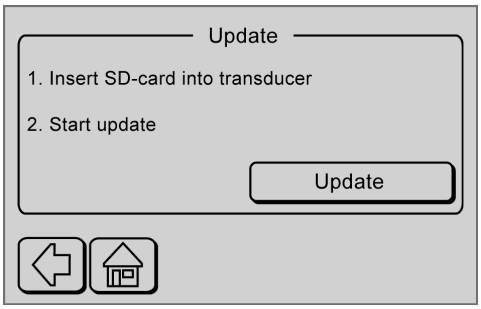
Switch back to the Memory Card menu without saving the input.

Deletes the last entered character.

Save the input and switch back to the Memory Card menu.
Without setting the old value is stored.

7.3 Update (Firmware)

Main Menu



Starts the Firmware-Update. Follow the instructions.

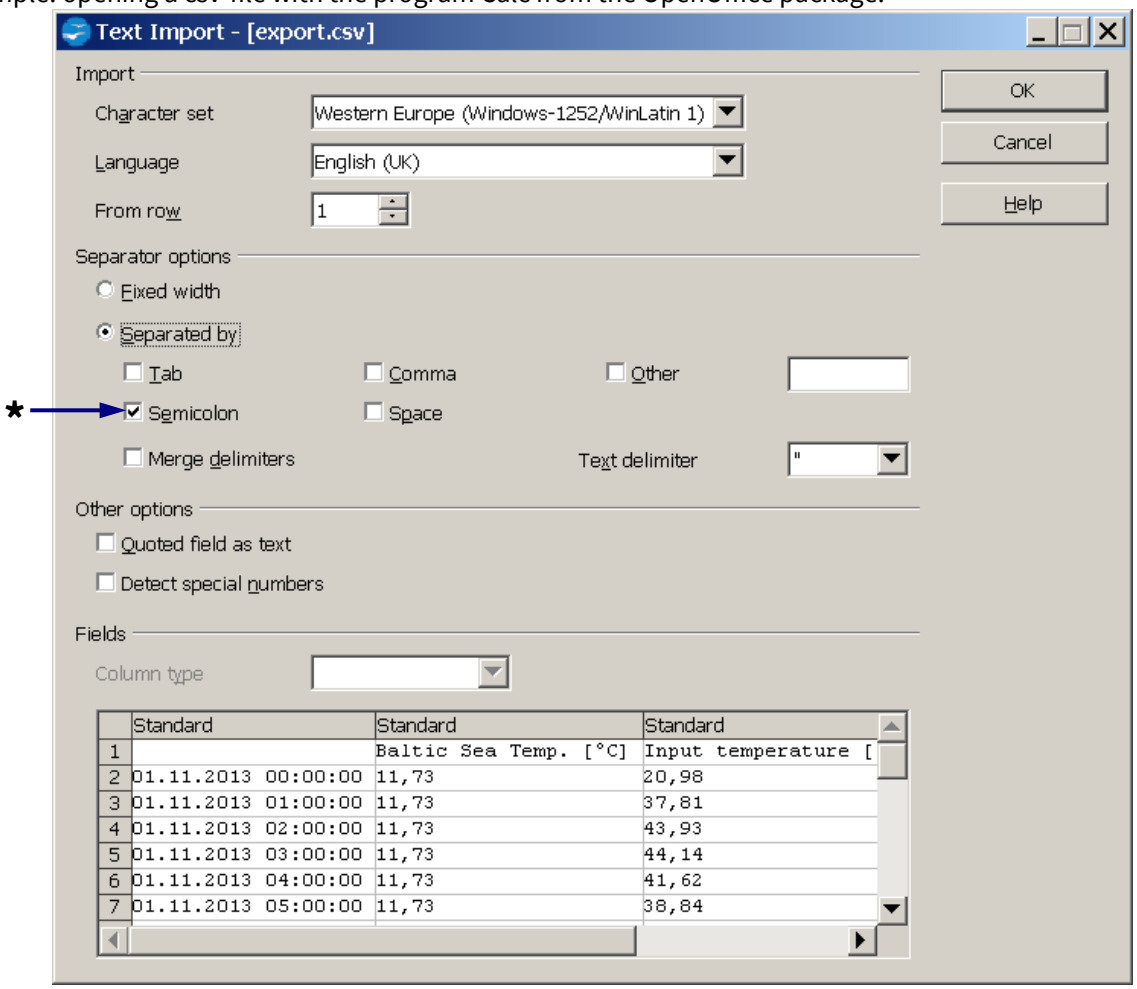
Switch back to the Main Menu.

Switch to the display of Measured Values.

7.4 Read Data

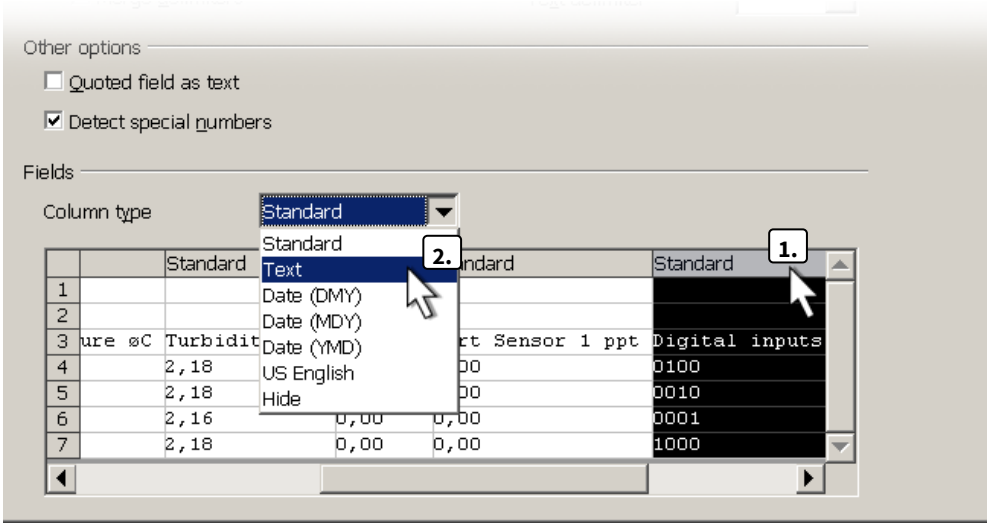
The transducer stores the states of the inputs (and therefore also the measured values) and the error messages as a csv-file. In this file the individual values are separated with a **semicolon***. It is recommended to open these files with a program that displays the data in a clearly arranged way.

Example: opening a csv-file with the program Calc from the OpenOffice package.

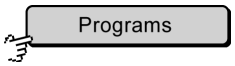


Note: If you selected English as the menu language of the BlueSense-Transducer, the decimal separator is a dot.

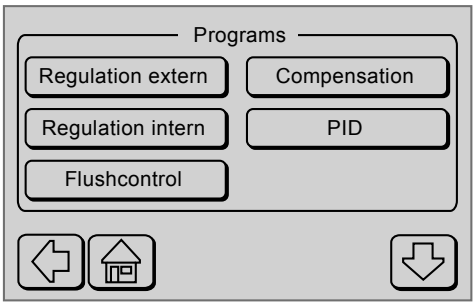
Note: Columns with entries with leading zeros (for example on digital inputs) must be converted when opened in the text format. Otherwise, leading zeros are ignored.

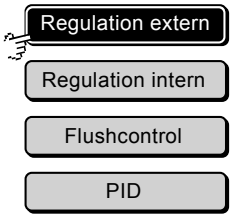


8 Programs



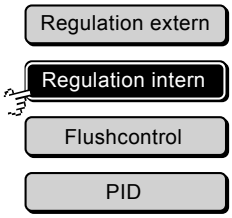
Main Menu





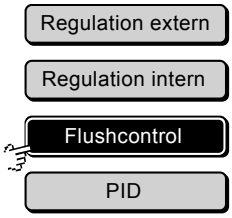
In the status "**regulation extern**" the current outputs and the relays are controlled by the remote station via the communication protocol.

The button is also a status indicator.



In the status „**regulation intern**" the current outputs and the relays are controlled by the transducer via the measurement values.

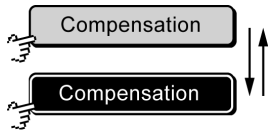
The button is also a status indicator.



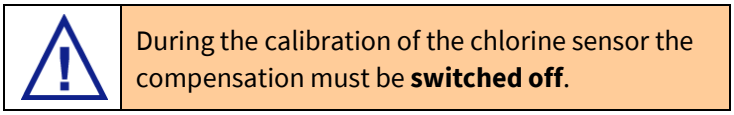
In the status „**Flushcontrol**" :

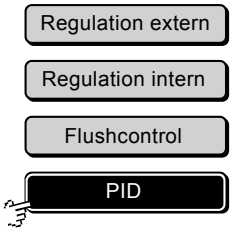
- The relays are controlled from the internal flush parameters (see parameters).
- The current outputs of the transducer are controlled via the measurement values.

The button is also a status indicator.
Pressing this button starts the flushing (see § 8.1).
After activating the flushcontrol, the measured values of the next ca. 60 seconds will not be saved on the SD card.



Switches the compensation of a chlorine measurement with pH-value and temperature on and off. The button is also a status indicator.
Precondition: chlorine measuring board and pH measuring board with integrated temperature measuring. If this precondition is not fulfilled, this function is without effect.





In the status „**PID**" the current outputs and the relays are controlled by the PID controller (Proportional–Integral–Derivative).*

The button is also a status indicator.
Pressing the activated button switches to the PID control parameters (see § 8.2).

* Is only effective if the PID controller is activated in the parameterization (see § 8.2).

Switch to the Main Menu.

Switch to the Parameter Display.

Switch to another programs menu, here without content.

8.1 Flushcontrol Parameters

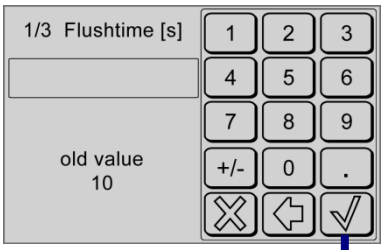
Flushcontrol Programs Menu

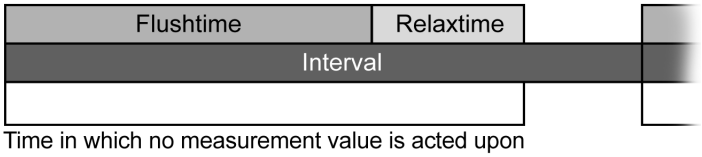
Setting of Flushtime, Interval and Relaxtime

The **Flushtime** is the duration of flushing, i.e. the time for which relays K1 and K3 close. In the flushtime no new measurement will be acted upon.

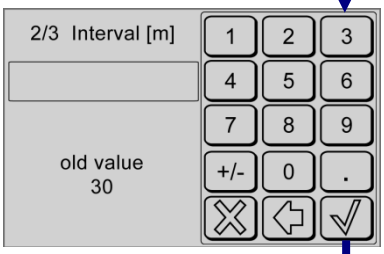
The **Interval** is the time between the beginning of a flush and the beginning of the next flush. If flushtime + latencytime is greater than the interval, then the next flush will occur 1 min after the relaxtime.

The **Relaxtime** is the time after the end of the flushtime in which the sensor can adjust to the surrounding medium. In this time no new measurement will be acted upon.

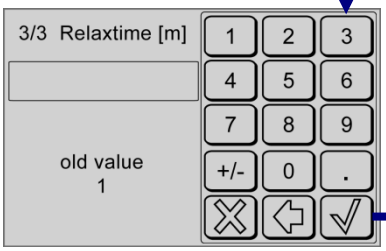


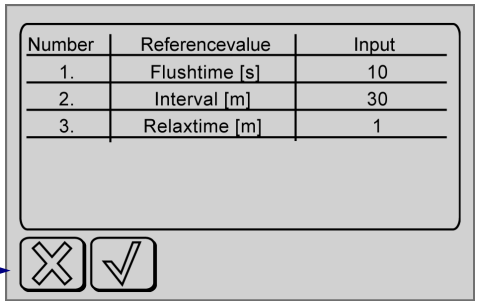


Time in which no measurement value is acted upon



Presently active values are shown as “old value“.





Aborts the setting and switches to the Programs Menu.

Deletes the last entered character.

Saves the input and switches to the next menu. Without setting the old value is stored.

Aborts the input and switches to the Programs Menu.

Saves the settings and switches to the Programs Menu.

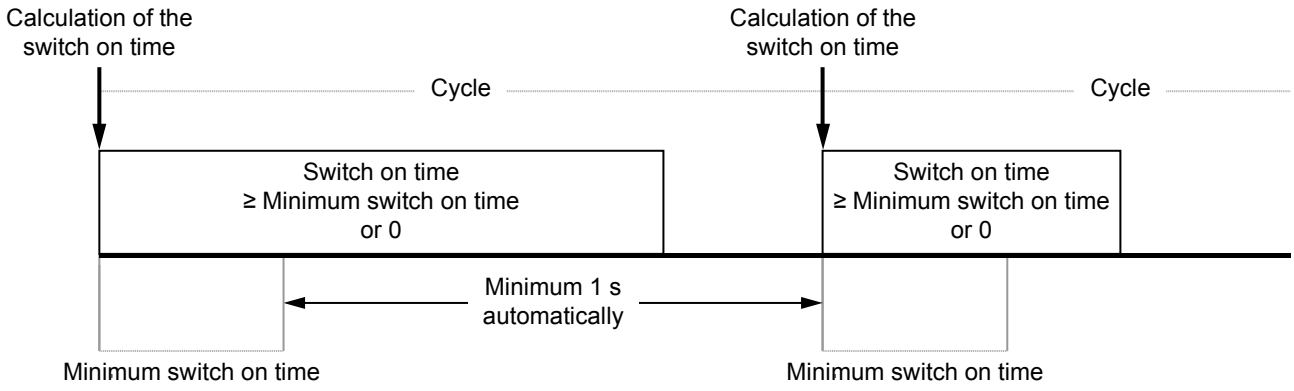
The settings of the Flushcontrol are saved and completed.

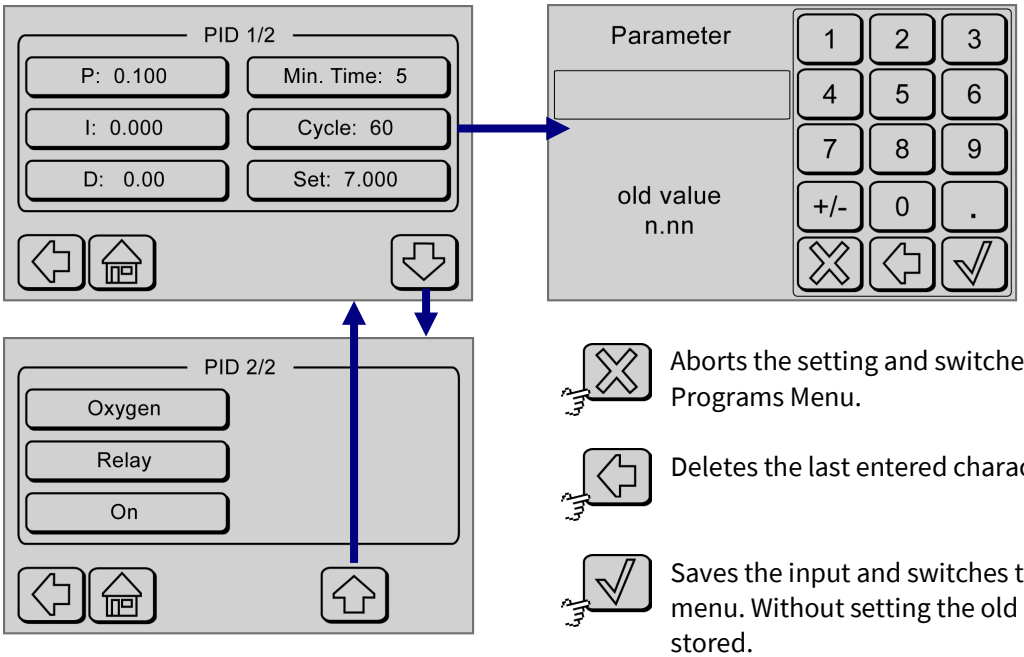
8.2 Parameter PID

Programs Menu

The PID controller has a proportional, an integral and a differential share of the control effect. The respective strength of the portion of the control action is determined by the input values for P, I and D.

Actual value is the measurement value of the associated sensor. **Desired value** is a value from the range of the associated sensor. **Actuating variable** is either a current of 4 mA - 20 mA (current output 1), or the difference between the on-and off the relay (contact parallel K1/K3).

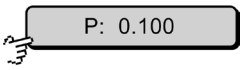

Calculation of the switch on time
Cycle
Switch on time ≥ Minimum switch on time or 0
Minimum 1 s automatically
Minimum switch on time
Calculation of the switch on time
Cycle
Switch on time ≥ Minimum switch on time or 0
Minimum switch on time



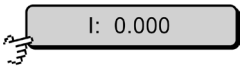
Aborts the setting and switches to the Programs Menu.

Deletes the last entered character.

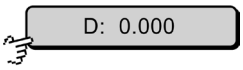
Saves the input and switches to the next menu. Without setting the old value is stored.



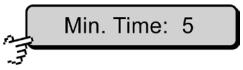
Switch to the input of the P-values.
Presently active values are shown as “old value“.



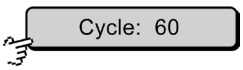
Switch to the input of the I-values.
Presently active values are shown as “old value“.



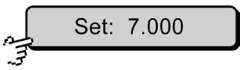
Switch to the input of the D-values.
Presently active values are shown as “old value“.



Switches to the input of the Minimum switch on time of the relay [s]. If the entered minimum time ≥ cycle, the program sets cycle = minimum +1.
Presently active values are shown as “old value“.



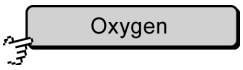
Switches to the input of the control interval [s].
Presently active values are shown as “old value“.



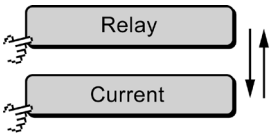
Switches to the input of the desired value. The input range is the measurement range of the associated sensor.
Presently active values are shown as “old value“.

Switch back to the Programs Menu.

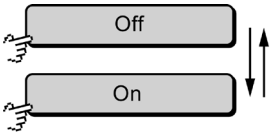
Switch to the Parameter Display.



Switches to the sensor selection of the PID control. The current sensor is displayed on the button.



Switches between the actuators relay (contact parallel K1/K3) and power output (current output 1) back and forth, the button is also a status display.



Deactivates and activates the PID control.
The button is also a status display.

Here you can deactivate the PID control without activating any other program in the Programs menu (see § 8)*.
While the PID control is disabled,

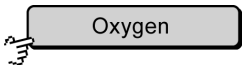
- shows the PID button in the Program menu (see 8) still an active status,
- no programs are running

Switch back to the Programs Menu.

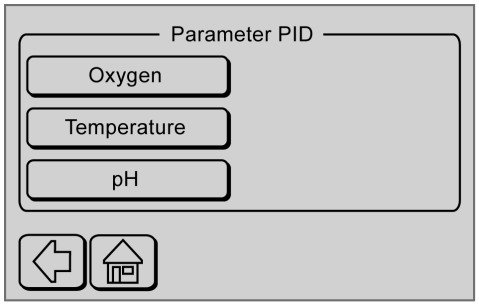
Switch to the Parameter Display.

* e.g. for a sensor calibration

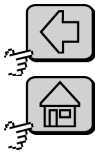
8.2.1 Parameter PID (Sensor selection)



Parameter PID 2/2



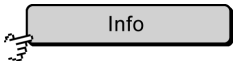
selection of the sensor of the PID control



Switch back to menu PID 1/2.

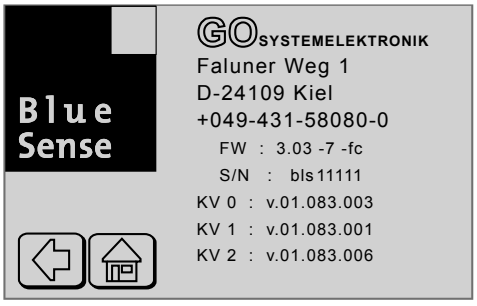
Switch to the Parameter Display.

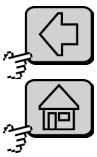
9 Info Transducer



Main Menu

Displays the firmware version (here 3.03 | -7 -fc is a service note), the serial number* (S/N) of the transducer and the serial numbers of the sensor measuring boards (KV 0, KV 1,…)





Switch back to the Main Menu.

Switch to the display of Measured Values.

* The serial number of the transducer is also the CAN-ID (in other contexts also called DAM-ID) of the transducer for a connected BlueBox (bls + 5 digits).

10 Version notice

Versions older than or identical to 1.03
Through an update to a newer version the transducer will lose its current output calibration.
The current outputs must then be recalibrated. An alternative path is to recompute the old calibration with version 0.05 (also possible retrospectively).

11 Installation notes

The Transducer should only be installed by skilled or instructed persons with the suitable tools. In the case of incorrect assembly serious malfunctions and errors can occur which can destroy the device.

Before connecting the device to electricity it is important to check the power supply network connection data (voltage and frequency) of your utility provider. This data must correspond. If in doubt, ask your electrician.

Only pull the plug from the Transducer when it is off, never when it is on!

Only use the Transducer when the lid is closed, so that no electrical components can be touched.

The electrical safety of the device and optimal RFI protection are only guaranteed if the device is connected to a properly installed protective conductor system. In case of doubt, call a professional to check the installation. The manufacturer cannot be held responsible for any damage or malfunctions caused by a missing or broken ground wire.

During installation the device must not be connected to the power supply mains!

The connection of the device to mains power shall not be via extension cables because these do not guarantee the necessary protection.

12 Maintenance instructions

The Transducer itself is maintenance free. The sensors, however, should be periodically cleaned and calibrated. The timeframes for cleaning and calibration depend heavily on the application.

Appendix A - Modbus

1. Introduction

The functionality of the Modbus protocol is limited to the following switches and registers. In future versions all settings will be able to be controlled via Modbus.
The registers are 32 bit.

2. Modbus mapping chart

2.1 Discrete Output Coils (Read & Write)

Number	Address	Description	Data format	Size
1	0x0000	Relay 1	Bit	1 Bit
2	0x0001	Relay 2	Bit	1 Bit
3	0x0002	Relay 3	Bit	1 Bit
4	0x0003	Relay 4	Bit	1 Bit
5	0x0004 to 0x0070	reserved for future functions	-N/A-	-N/A-

2.2 Discrete Input Coils (Read-Only)

Number	Address	Description	Data format	Size
1	0x0000	Digital Input 1	Bit	1 Bit
2	0x0001	Digital Input 2	Bit	1 Bit
3	0x0002	Digital Input 3	Bit	1 Bit
4	0x0003	Digital Input 4	Bit	1 Bit
5	0x0004 - 0x0070			

2.3 Analogue Output Holding Registers (Read & Write)

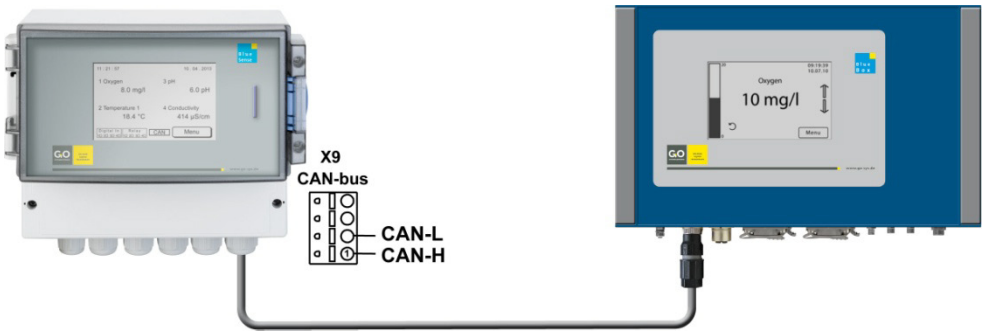
Number	Address	Description	Data format	Size
1	0x0000	analogue value of current output 1	Double	1 Register
2	0x0001	analogue value of current output 2	Double	1 Register
3	0x0002 to 0x000F	reserved for future functions	-N/A-	-N/A-
4	0x0010 to 0x0013	name of the first measurement value	Char	4 Register
5	0x0014 to 0x0017	name of the second measurement value	Char	4 Register
6	0x0018 to 0x001B	name of the third measurement value	Char	4 Register
7	0x001C to 0x001F	name of the fourth measurement value	Char	4 Register
8	0x0020 to 0x0023	name of the first pulse input	Char	4 Register
9	0x0024 to 0x0027	name of the second pulse input	Char	4 Register
10	0x0028 to 0x002B	name of the first current output	Char	4 Register
11	0x002C to 0x002F	name of the second current output	Char	4 Register
12	0x0030 to 0x0040	reserved for future functions	-N/A-	-N/A-

2.4 Analogue Input Register (Read Only)

Number	Address	Description	Data format	Size
1	0x0000	first measurement value	Double	1 Register
2	0x0001	second measurement value	Double	1 Register
3	0x0002	third measurement value	Double	1 Register
4	0x0003	fourth measurement value	Double	1 Register
5	0x0004	first pulse input	Double	1 Register
6	0x0005	second pulse input	Double	1 Register
7	0x0006 to 0x000F	reserved for future functions	-N/A-	-N/A-
8	0x0010 to 0x0011	first unit of the first measurement value	Char	2 Register
9	0x0012 to 0x0013	second unit of the first measurement value	Char	2 Register
10	0x0014 to 0x0015	first unit of the second measurement value	Char	2 Register
11	0x0016 to 0x0017	second unit of the second measurement value	Char	2 Register
12	0x0018 to 0x0019	first unit of the third measurement value	Char	2 Register
13	0x001A to 0x001B	second unit of the third measurement value	Char	2 Register
14	0x001C to 0x001D	first unit of the fourth measurement value	Char	2 Register
15	0x001E to 0x001F	second unit of the fourth measurement value	Char	2 Register
16	0x0020 to 0x0040	reserved for future functions	-N/A-	-N/A-

Appendix B - Connection to a BlueBox

Precondition: The transducer has a CAN-bus interface.



Connect the cable with CAN-H and CAN-L at the transducer (see connection diagram page 9 or 10). Connect the BlueBox with a fitting M12-connector.
The BlueBox identifies the transducer automatically and displays the measurement and input values.

The serial number of the transducer (see *9 Info Transducer*) is also the CAN-ID[1] of the transducer for a connected BlueBox (bls + 5 digits).

Sensor-ID = CAN-ID[1] + Sensor number (max. 17)

Sensor numbers of the transducer in order:

- max. 4 connected sensors
- salinity as a computed value from a conductivity measurement[2]
- 2 pulse inputs
- 4 digital Inputs
- 2 current outputs
- 4 relay outputs

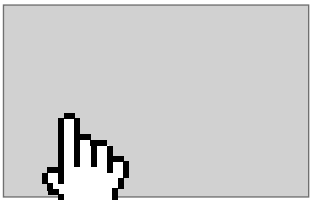
Depending on the number of connected sensors the Sensor numbers of the following sensors respectively inputs and outputs[3] increase or decrease.

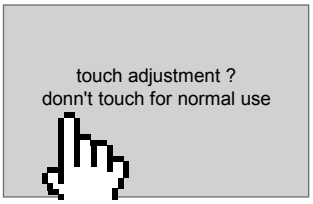
[1] In other contexts also called DAM-ID.
[2] if active / Salinity according to the general formula of the UNESCO for seawater
[3] Strictly speaking the outputs are no sensors but actuators. These outputs are controlled by the BlueBox in the status of "Regu lation extern" (see § 8 Programs).

Appendix C - Adjustment of the touch display

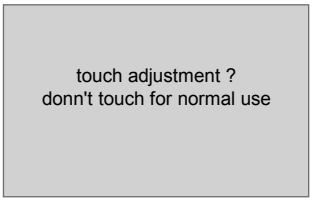
If the display responses not, wrong or only under large pressure, a display adjustment is necessary.

While switching on power, press display until the notice
"touch adjustment ?
don't touch for normal use"
appears.

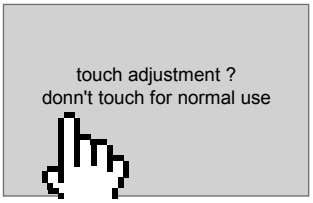




Left off the display immediately!

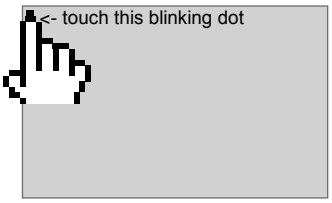


Press the display immediately again for more than one second.



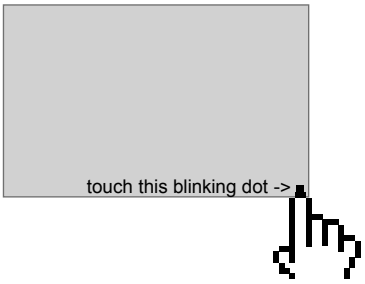
A blinking dot appears at top left.

Press the blinking dot top left.



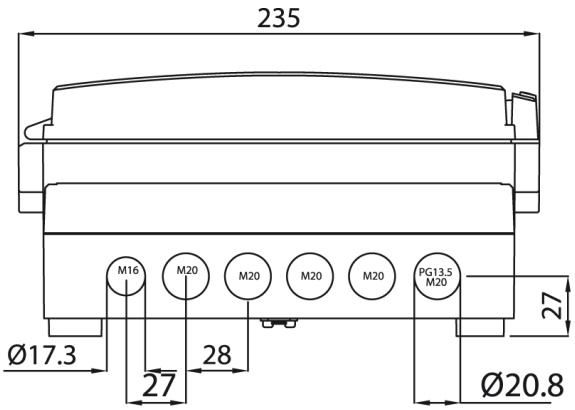
A blinking dot appears at bottom right.

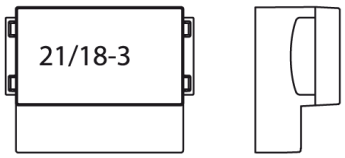
Press the blinking dot bottom right.



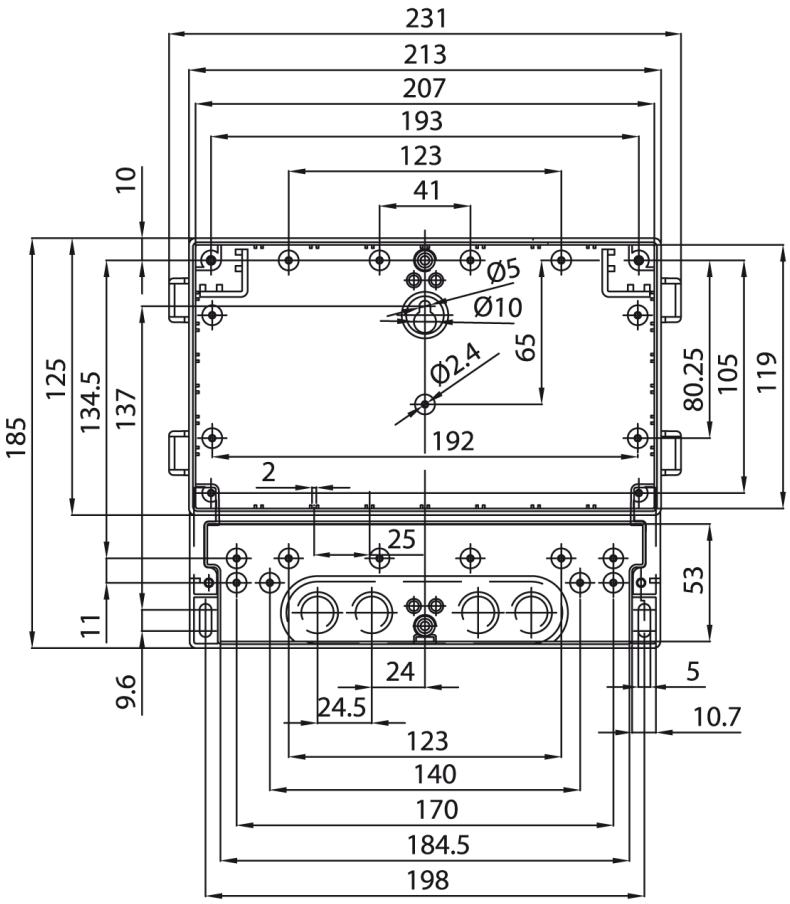
The adjustment is finished.

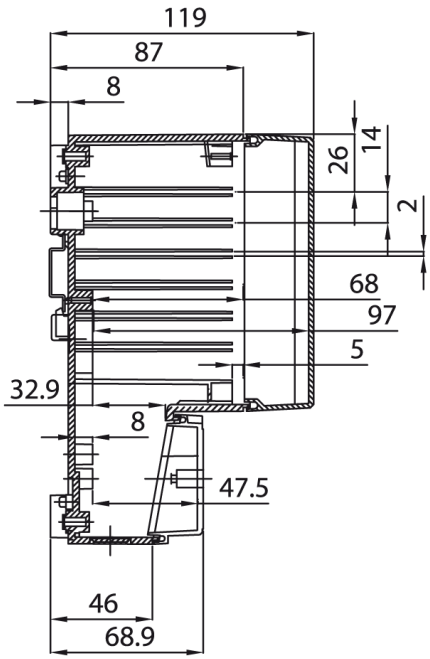
Appendix D - Housing dimensions





5 x M20 + M16

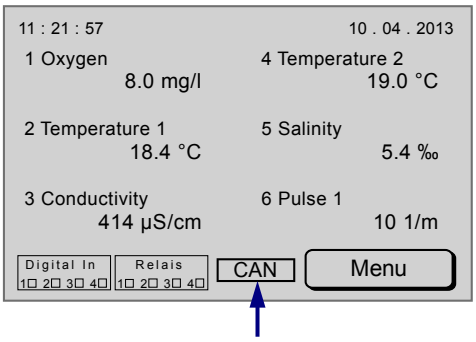




21/18-3

Appendix E - Status and error messages

1 Status messages



Status messages appear at the bottom of the Parameter Display.

- yet no bus connection is detected

CAN

- flashing: CAN-bus card is detected, CAN-bus speed is still unknown

CAN5

- CAN-bus speed detected (here 5 kbit/s), device is registered on the CAN-bus

  flashing: CAN-bus connection is disconnected

CAN50

- CAN-bus speed detected (here 50 kbit/s), device is registered on the CAN-bus

  flashing: CAN-bus connection is disconnected

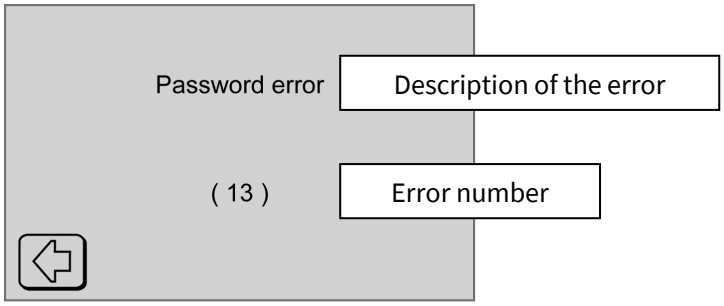
RS232

- RS-232 card is detected.

RS485

- RS-485 card is detected.

2 Error messages



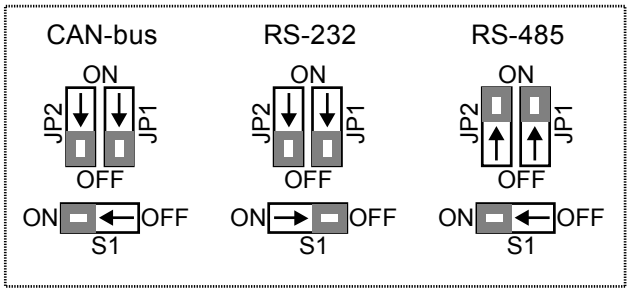
Error messages appear in a separate menu.
The backlight of the display flashes.

Switch back to the previous menu.

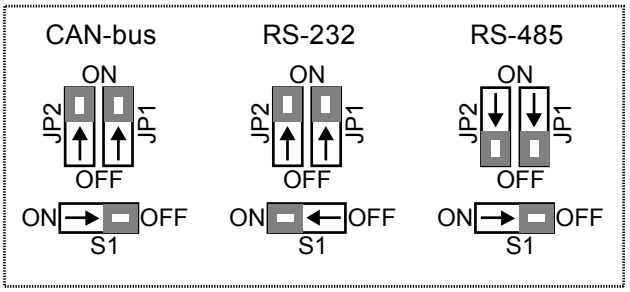
Password error **(13)**	• incorrect password input Entry into csv-file: **4096**
Communication error! **(10)**	• The connection between the motherboard and the display is interrupted. Entry into csv-file: **32768**
Error during data record! **Please check memory card.** **(50)**	• SD Memory Card error during a recording Entry into csv-file: **16384**
No memory card found! **(99)**	• SD Memory Card missing
critical battery voltage **(11)**	• The supply voltage has dropped below 11.5 volts. *If the supply voltage is below 11 V, the transducer will be switched off.* Entry into csv-file: **2048**
	• no error Entry into csv-file: **0**

At combined errors, the error sum is entered in the csv-file.

Appendix F - DIP switch configuration



DIP switch configuration Type I



DIP switch configuration Type II

Type I is applicable for:

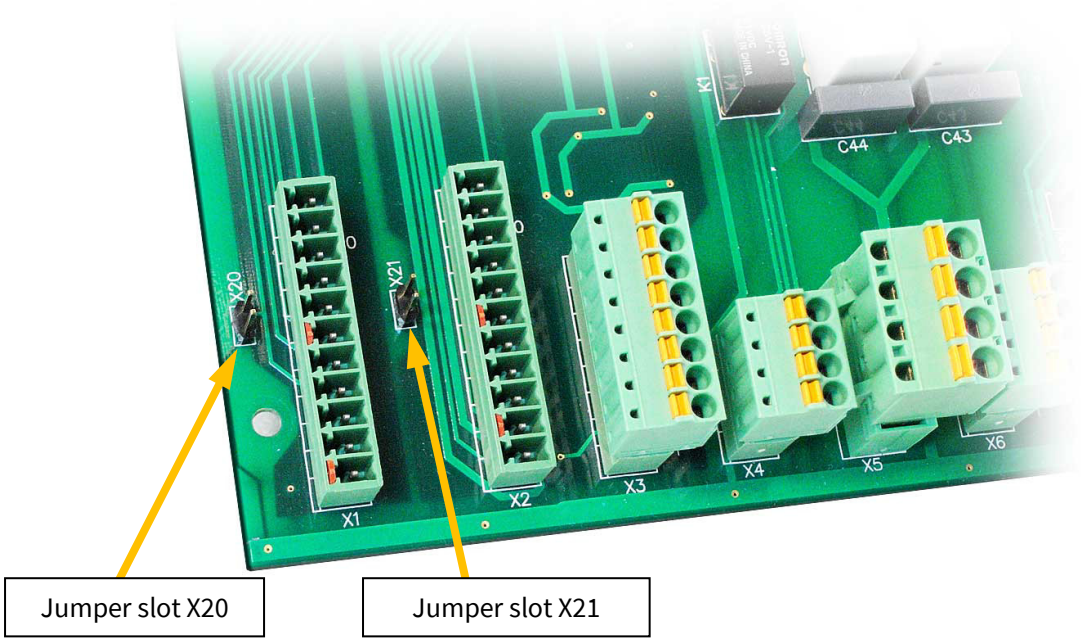
- white switch slider
  and
  motherboard Version A
- red switch slider
  and
  motherboard Version B

Type II is applicable for:

- white switch slider
  and
  motherboard Version B
- red switch slider
  and
  motherboard Version A

Appendix G - Differentiation motherboard Version A⇔B

The motherboard Version B is different from the motherboard Version A in that on the motherboard Version B **two additional jumper slots are mounted (X20 and X21)**. These jumper slots are located in the **lower left corner** of the motherboard, visible after removing the front cover of the housing.



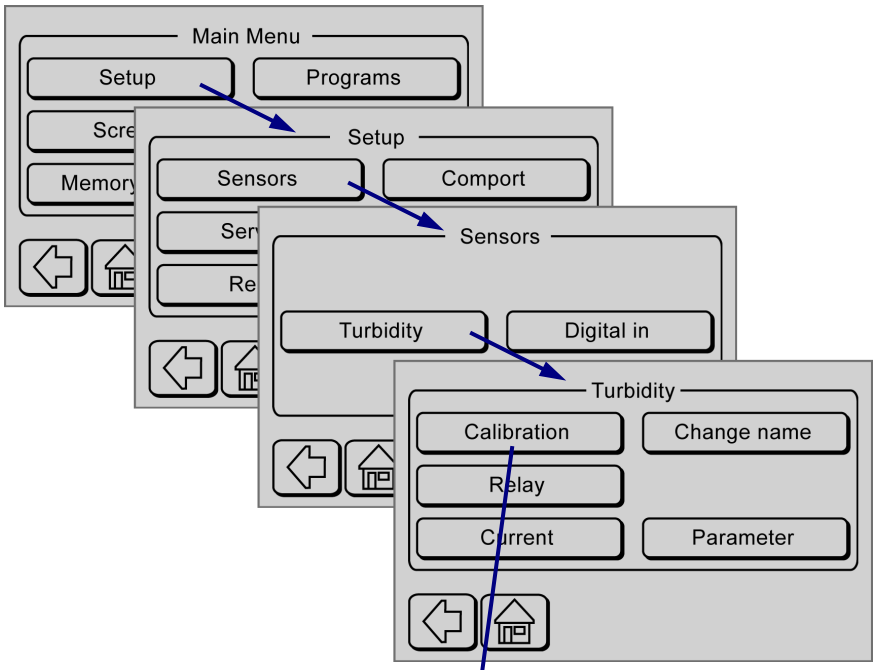
If these jumper slots exist, it is motherboard Version B.
If these jumper slots do **not** exist, it is motherboard Version A.

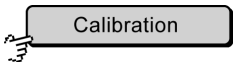
If the motherboard can not be clearly assigned, please contact GO Systemelektronik.

Appendix H - Multipoint calibration

Multipoint calibration, example turbidity

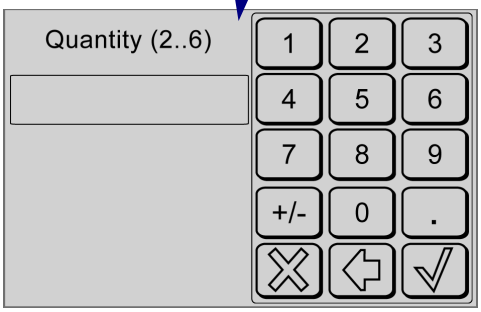
1. Request





Activation of the calibration menu

2. Input of the measurement points*



Here you enter the number of measurement points.

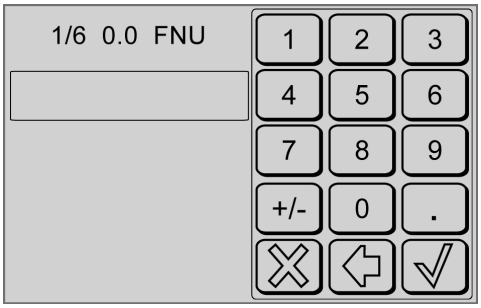
Switch back to the turbidity menu without saving the input.

Deletes the last entered character.

Saves the input and switches back to the next menu.
Without input the value is set to 2.

* At some sensors there is before a menu for selecting a gain.

3. Input of the calibration values



Immerse the sensor into the calibration medium. Enter the turbidity value of the calibration medium.

1/6 actual number of the measurement point / number of measurement points

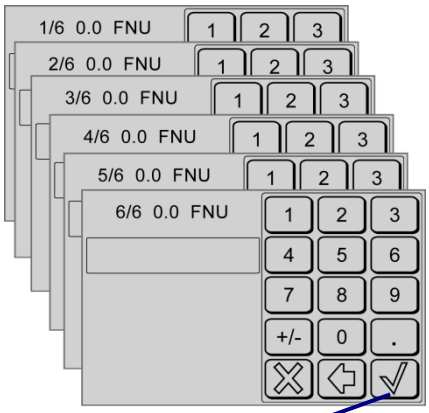
0.0 actual measurement value and therefore reference value, here 0.0

FNU unit of the measurement, here FNU for turbidity

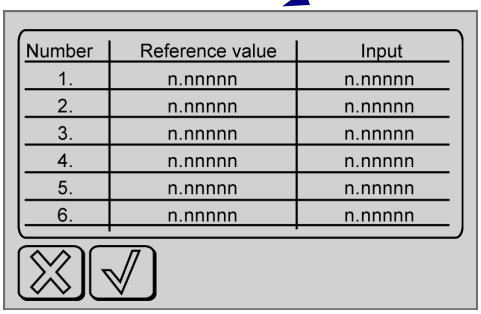
Aborts the calibration and switches back to the turbidity menu.

Deletes the last entered character.

Saves the input and switches to the next menu.
Without a setting the value is set to 0. Not recommended!



4. Finalizing the calibration



List menu:
List of Reference values
List of Input values

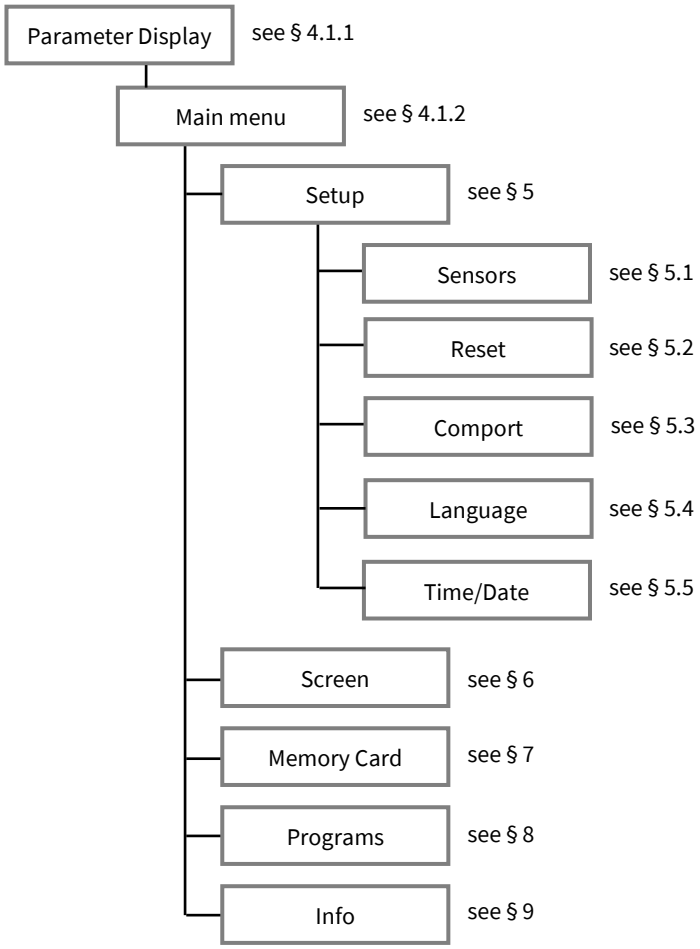
Aborts the calibration and switches back to the turbidity menu.

Saves the in calibration and switches back to the turbidity sensor menu.

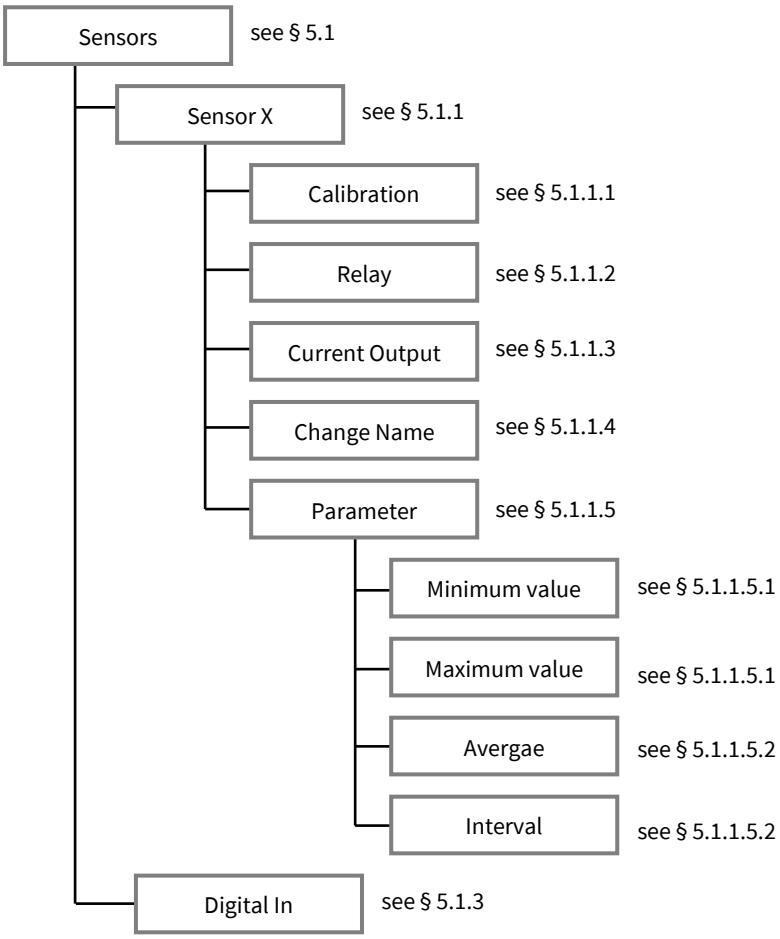
The calibration is saved and completed.

Appendix I - Menu structure

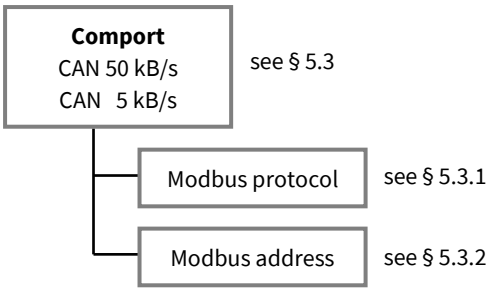
Main structure



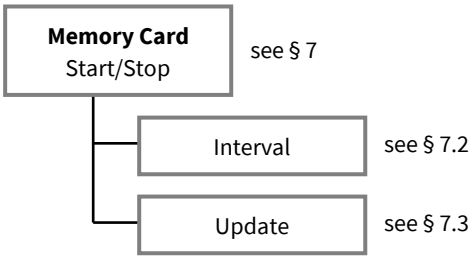
Sensors



Comport



Memory Card



Programs